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ABSTRACT

This report summarizes activities and findings of a federally funded center at the University of Miami (Florida) which reviewed and disseminated literature on the identification and assessment of children with attention deficit disorders (ADD). The review covers the literature published between 1980 and 1992 and is organized topically. In addition to introduction and background sections, individual sections synthesize the literature on: (1) instruments used to assess ADD; (2) the educational characteristics of children with ADD, subtypes of ADD, and coexistence of ADD with other disorders such as learning disability and conduct disorder; (3) assessment and identification of preschool age children with ADD; (4) issues regarding ethnicity and socioeconomic status in the assessment and identification of children with ADD; and (5) studies of the families of children with ADD. A final chapter identifies limitations of the literature, summarizes the major findings concerning educational variables relevant to assessment, considers concerns about sociodemographic and multicultural issues, and relates findings to educational assessment. Appendices present the synthesis methodology. (Contains references for each chapter.) (JDD)

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A SYNTHESIS OF RESEARCH LITERATURE ON THE ASSESSMENT AND IDENTIFICATION OF ATTENTION DEFICIT DISORDER

Education of Children with Attention Deficit Disorder

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A SYNTHESIS OF RESEARCH LITERATURE ON THE ASSESSMENT AND IDENTIFICATION OF ATTENTION DEFICIT DISORDER

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Prepared For

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A Synthesis of the Research Literature on the Assessment and Identification of Attention Deficit Disorder

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VI. ADMINISTRATIVE (pertaining to the likely number of individuals who require special education and related services, needs for personnel preparation, coordination of service delivery, professional and parent roles/responsibilities)

INTRODUCTION

The purpose of this document is to synthesize the research literature on the assessment and identification of children with Attention Deficit Disorder (ADD). While Congress was considering the 1990 amendments to the Education of the Handicapped Act (now the Individuals with Disabilities Education Act, or IDEA), advocates of children and youth with ADD argued that these individuals have a problem that reduces their educational performance and proposed that ADD become a qualifying disability for special education and related services (Aleman, 1991). However, many educational organizations (e.g., the National Association of State Directors of Special Education, the National Education Association, the Council for Exceptional Children) objected to the inclusion of ADD as a separate disabling condition. These groups argued that (1) many children and youth with ADD already qualify for special education and related services because they are also learning disabled (LD) or seriously emotionally disturbed (SED); (2) if all individuals with ADD were to become eligible for special education, limited resources would be diverted from more disabled students; and (3) ADD is difficult to define or identify (Aleman, 1991).

After considerable debate, the Congress compromised by requiring the Office of Special Education Programs (OSEP), Department of Education, to (1) collect public comments on several questions about ADD and report the findings to Congress,

and (2) establish centers to synthesize and disseminate the most current knowledge about ADD (Aleman, 1991). To comply with the first part of this mandate, OSEP funded four centers: two to synthesize the literature on assessment and identification of children with ADD, which are located at the University of Arkansas and the University of Miami, and two to synthesize the literature on treatment of children with ADD, which are located at the Research Triangle Institute and the University of California at Irvine.

This document has been produced by the University of Miami Center for Synthesis of Research on Attention Deficit Disorder. It synthesizes the research relevant to the assessment and identification of children with ADD based on the literature published between 1980 and 1992. This document is organized topically; that is, in addition to the introduction and background sections, there are different sections synthesizing the literature relevant to: the instruments used to assess ADD; the educational characteristics of children with ADD and subtypes of ADD, and the coexistence of ADD with other disorders such as learning disabilities and conduct disorder; assessment and identification of preschool-aged children with ADD; issues regarding ethnicity and socioeconomic status (SES) in the assessment and identification of children with ADD; and studies of the families of children with ADD.

Background Literature on ADD

In 1902 Still described 20 children to the Royal College of

Physicians who appeared to lack "inhibitory volition" (Barkley, 1990; Shaywitz & Shaywitz, 1988). Still and other physicians of the time speculated that these defects were due to brain cell modification (i.e., structural damage or growth retardation), and that even milder forms (i.e., minimal damage) could produce defects in "moral" control related to delinquency, alcoholism, depression and suicide. This theory lay the foundation for the concept of "minimal brain dysfunction" (Barkley, 1990; Ross & Ross, 1982; Shaywitz & Shaywitz, 1988). Basically, the term "minimal brain dysfunction" (MBD) represents the presumption of neurological deficiency as the basis of learning, attentional, and affective disorders in the absence of firm evidence for anatomical and biochemical defects of the brain.

Minimal Brain Dysfunction (MBD) and Attention Deficits

The development of the theory of minimal brain dysfunction in the United States, along with widespread scientific interest in attention and hyperactivity, was stimulated by an epidemic of encephalitis in 1912 (Cantwell, 1981). Following the epidemic, physicians were presented with a large number of children who had survived brain infection, but were described as inattentive, hyperactive, and deficient in specific cognitive abilities such as perception and memory. Additionally, they were often perceived socially as impulsive, defiant and oppositional (Barkley, 1990; Cantwell, 1981; Shaywitz & Shaywitz, 1988). In addition to infectious diseases of the brain, other potential causes of MBD were associated with childhood learning and behavior disorder,

including prenatal complications and birth trauma, exposure to toxins such as lead, and other known neurological conditions such as epilepsy and cerebral palsy.

During the 1950s much of the research tended to focus on hyperactivity as the major symptom of interest with respect to treatment and underlying neurological mechanisms (Barkley, 1990). Also, reports began to appear on the beneficial effects of stimulant medication on disruptive behavior and academic performance. By 1980 extensive research had been performed demonstrating the efficacy of stimulant medication for the treatment of hyperactivity (Sprague & Sleator, 1976; Werry & Sprague, 1974).

Research on the behavioral symptoms and treatment of hyperactivity led to the concept of "hyperactive child syndrome", which emphasized hyperactivity as the central feature of attention disorders. This led to the inclusion of hyperactivity as a separate disorder called Hyperkinetic Reaction of Childhood in the second edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-II) of the American Psychiatric Association (APA) in 1968. However, after two decades of research on MBD, many leaders in the field became disenchanted with this concept, and a number of critical reviews questioned its validity and practical utility (Rie & Rie, 1980; Rutter, 1977, 1982). This led to a broader focus on the nature of attention deficits and their defining behavioral characteristics.

In 1972 Douglas argued that difficulties in learning and

social behavior were often seen in children who were not hyperactive, but nevertheless displayed deficits in sustained attention and impulse control, and that these deficits were the basis of the poor performance of hyperactive children as well. She showed that hyperactive children did not necessarily experience more difficulty on all cognitive tasks, but repeatedly performed poorly on tasks that required vigilance, sustained attention and impulse control. Later, other investigators found that while hyperactivity tended to abate as children approached adolescence, problems with sustained attention and impulsivity remained and were associated with elevated risk for academic and social adjustment problems (Barkley, 1990; Brown & Borden, 1986; Weiss & Hechtman, 1986).

Subsequently, Douglas (1972, 1983) articulated the theory that symptoms of Attention Deficit/Hyperactive Disorder were due to basic deficits in (a) the investment, organization and maintenance of attention and effort, (b) the inhibition of impulsive responding, (c) the ability to modify arousal level to meet changes in environmental demands, and (d) the ability to delay immediate reinforcement. Douglas's views stimulated considerable research during the 1970s and 1980s, which led to the reconceptualization of Hyperactive Childhood Disorder in DSM-II as Attention Deficit Disorder (ADD) in DSM-III (APA, 1980).

Attention Deficit Disorder and Special Education

The concept of MBD was quite influential in the field of special education, particularly in the early definitions,

assessment procedures and educational interventions designed for children with learning disabilities (LD) (Hallahan, Kauffman & Lloyd, 1985). The Federal definition of LD incorporated in PL 94-142 includes "such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia." Similarly, although the Federal definition of seriously emotionally disturbed (SED) does not incorporate the concept of MBD in the definition, it is nevertheless a part of the history of the field (Cullinan, Epstein & Lloyd, 1983) insomuch as a link is drawn between special education and the needs of children who show disruptive behavior disorders associated with hyperactivity and attention deficit disorders (Kauffman, 1989). Attentional problems are also observed frequently in children with mild to moderate mental retardation, and a number of theories have been developed based on attentional processes to explain the cognitive deficiencies of retarded children in areas such as concept formation, memory, and problem-solving.

Much of the early work on intervention in special education involved "brain-injured" and "MBD" children who were in institutions for the retarded at the time. During the late 1950s and early 1960s, the term " Strauss syndrome" was often used to designate both the diagnosis and preferred approach to special education for attention disordered and hyperactive children (Hallahan et al., 1985). Finally, it should also be noted that the Learning Disabilities Research Institute at the University of Virginia was funded in 1979 to study and develop interventions

for children with LD who had attention disorders (Hallahan et al., 1985).

Definitions of ADD

The critical definition and diagnostic criteria for Attention Deficit Disorder (ADD) is specified by the American Psychiatric Association (APA) in its Diagnostic and Statistical Manuals (DSM). This diagnostic system is based on the consensus of clinicians and scientists with established expertise with particular disorders. For instance, DSM-III-R (APA) was developed from the work of 26 advisory committees with over 200 members. Draft forms are field reviewed, and consensus criteria are then validated in field trials before revisions are adopted in practice.

In this synthesis we are following the convention of referring to ADD as the generic condition. However, it is important to distinguish between the terms ADD, ADD with and without hyperactivity, and ADHD (Attention Deficit Hyperactivity Disorder) because they connote different conceptualizations of the disorder and influence the primary characteristics that have been used to identify research samples in the literature since 1980. These distinctions will be explained below.

DSM Criteria for ADD

It is important to note that DSM is a clinical classification system that is used in practice and research on mental disorders as opposed to an empirically derived classification system (Lyon, 1983; McKinney, 1988). Each approach

has its major purpose, strengths and weaknesses which have been debated at length (Keogh, 1986b; McKinney, 1988). The distinction between clinical and empirical classification is relevant to the issues addressed in this synthesis because the findings from research on ADD are necessarily limited by (a) how the disorder is defined in various studies, (b) how it relates to other disorders as they are defined, and (c) what and how relevant dimensions are measured. Many of the issues in the definition and classification of ADD relate to problems in the use of different classification systems as well as measurement.

The publication of DSM-III in 1980 represented a major change in the conceptualization of ADD. Based on the research of the 1970s, the DSM-II category of Hyperkinetic Reaction of Childhood was replaced with ADD with and without hyperactivity. ADD was now defined as ". . . developmentally inappropriate inattention, impulsivity, and hyperactivity . . . for his or her mental and chronological age" (American Psychiatric Association, 1980, pp. 43-44). The criterion for onset was before the age of seven and that for duration was at least six months. The inclusionary criteria included at least three of five symptoms of inattention, three of six for impulsivity, and two of five for hyperactivity. Schizophrenia, Affective Disorder, and Severe or Profound Mental Retardation were excluded by diagnosis. Based on prevailing theory and research at the time (Cantwell, 1983; Douglas & Peters, 1979), DSM-III specified two subtypes of the disorder that designated the presence (ADDH) or absence (ADD no

H) of hyperactivity as a defining feature of the disorder. However, subsequent field trials revealed considerable confusion about the subtypes in that ADD was seldom classified in the absence of hyperactivity (Shaywitz & Shaywitz, 1988).

Additional confusion was created by the intent in DSM-III to clearly separate ADD from Learning Disabilities (referred to in DSM-III as Academic Skills Disorders). ADD was grouped with "Disruptive Disorders of Childhood" (which included conduct and oppositional/defiant disorders), and LD was grouped with "Specific Developmental Disorders" (which included speech and language disorders).

Unfortunately, the revision of DSM-III that followed the clinical field trials further confused the distinction between attention deficits and hyperactivity as well as the distinctions among ADD, LD, and disruptive behavior disorders. In contrast to DSM-III, DSM-III-R created a composite disorder referred to as Attention Deficit Hyperactivity Disorder (ADHD) which, like DSM-II, focused on hyperactivity as the primary construct and on its relationship to disruptive behavior disorders (American Psychiatric Association, 1980, pp. 50-58). The essential features of ADHD were described as "developmentally inappropriate degrees of attention, impulsiveness and hyperactivity" (p. 50). However, with respect to differential diagnosis (p. 52), it was noted that "signs of impulsiveness and hyperactivity are not present in Undifferentiated Attention Deficit Disorders", which remained undefined. According to Barkley, Costello and Spitzer (1989), the

decision to eliminate, or leave undefined, ADD no H as a subtype of ADD was based on the belief by some committee members that ADD no H might be a type of nonverbal learning disability. They believed ADD no H might be better conceptualized as a specific developmental disorder as opposed to a disruptive behavior disorder, which reflected the current thinking about ADD with hyperactivity.

DSM-III-R also indicated that the associated features of ADHD included symptoms of oppositional/defiant disorder, conduct disorder, and specific developmental disorders, further blurring the distinction among these. Further, DSM-III-R noted that while ADHD is often not recognized prior to school entry, the onset can appear before age four. The estimated prevalence was three percent of children, and criteria for severity were based on the number of symptoms present above the required eight of fourteen symptoms needed for the diagnosis.

DSM-IV Options

DSM-III-R is currently in the process of being revised, and the field trials to evaluate current options for DSM classification are underway. The task force on DSM-IV for APA has published a DSM IV Options Book (American Psychiatric Association, 1991) that summarizes work in progress. Several changes are being considered for revising the description of ADHD in DSM-III-R. The first is whether to divide the ADHD symptoms into two groups (inattention and hyperactivity/impulsivity), a change indicated by some recent research on ADD subtypes, or to

return to a separate listing of the three behavioral constructs like that found in DSM-III to clarify the relationship between ADD with and without hyperactivity and unconfound the relationship between ADD and disruptive behavior disorders (i.e., Conduct Disorder).

The second is to tighten the threshold for classification and expand the number of symptoms to reduce the likelihood of over-identification, and for the same reason to emphasize observation of the symptoms in school and other "more structured" settings. The argument is that observations in the more structured settings are more reliable than observations at home and/or in the physician's office.

Finally, a third option that may be proposed is conceptualizing ADHD and ADD without hyperactivity as distinctly separate disorders with two separate lists of symptoms. Under this option, what is now described as Undifferentiated ADD would be encompassed under ADD without hyperactivity. At present writing, the results of the 1992 field trials are being evaluated and draft descriptions of the proposed criteria for various disorders are being considered.

In any event, there appears to be considerable consensus that inattention, impulsivity and excessive levels of activity are the essential features of the disorder. In essence, significant deviation from normal children of the same age and gender on measures of these behaviors define the inclusionary criteria for the disorder. There are also significant decisions

with respect to exclusionary criteria and severity of the symptoms that must be considered (Barkley, 1990; Shaywitz & Shaywitz, 1988). Finally, the current trend is to place heavy emphasis on the assessment of the disorder in schools before a diagnosis of ADD is confirmed.

Primary Manifestations of ADD

Inattention and distractibility. Attention is a multidimensional concept that involves alertness, arousal, selectivity, and vigilance, or sustained attention (Barkley, 1990; Hallahan & Reeve, 1980; Keogh & Margolis, 1976), and it can vary with setting and task demands. Inattention/distractibility, as stated above, is central to the concept of ADD: teachers and parents often complain that children with ADD "don't listen", "can't concentrate", "are easily distracted", "don't finish tasks", "lose things", and "require more than typical supervision."

The type of attention assessed and the situational variability of attentional process is important to the assessment and identification of children with ADD. For example, while the research has been contradictory, some studies indicate that the major problem for children with ADD is sustaining attention in boring, repetitive tasks such as unsupervised seatwork and routine chores (Barkley & Ullman, 1975; Douglas, 1983; Routh & Schroeder, 1976; Zentall et al., 1985). On the other hand, some studies show that children with ADD are more distracted by external stimulation than normal children (Rosenthal & Allen,

1978), while others report no effect for extra task stimulation and some report a beneficial effect on task performance (Zentall, Falkenberg, & Smith, 1985).

The importance of improved attention for children with ADD cannot be over-emphasized. Teacher and parent ratings of attention/distractibility and classroom observations of on-task/off-task behavior have been related consistently to individual differences in achievement for general school samples (McKinney, 1989), have been shown to differentiate categories of handicapped children (McKinney & Forman, 1982; Schaefer, 1981) and have provided better prediction of academic progress over time than measures of ability for both normal and special education students (McKinney, 1989; McKinney & Speece, 1983). Obviously, deficits in attention help explain the poor academic performance of students with ADD.

Finally, it should be noted that theory and research on the role of attentional processes in learning and the regulation of behavior has had a significant impact on research and practice in special education (Hallahan & Reeve, 1980; Keogh & Margolis, 1976). Problems of inattention combined with poor academic performance constitute the bulk of referrals for evaluation for special education (Barkley, 1982; Hallahan & Reeve, 1980).

Impulsivity and disinhibition. The second major manifestation of ADD is difficulty in inhibiting behavior in response to situational changes in the child's stimulus environment. Inhibition is similar conceptually to selective

attention in that it involves the ability to screen out extraneous stimulation. It also involves preventing inappropriate verbal or motor behavior in social contexts (e.g., impulsive responding). Like inattention, impulsivity is multidimensional and is inappropriate relative to a given context (Hallahan et al., 1985; Henker & Whalen, 1980; Shaywitz & Shaywitz, 1988).

According to Barkley (1990), the particular aspects of impulsivity and situations in which it is displayed remain unclear. However, children with ADD are typically described as "responding quickly without thinking", "making many needless or careless errors", "taking unnecessary risks", and "carelessly damaging their own or others' property." Parents and teachers often report that their ADD children are "accident prone", "start tasks without instruction or supervision", "jump start conversations", "interrupt others", and "blurt out answers - can't wait turn" (Barkley, 1990; Hallahan et al., 1985; McKinney & Feagans, 1980). The social consequences of such behavior are well known (Bryan & Bryan, 1983; Greshman, 1986). Many adults and peers regard ADD children as immature, irresponsible, and rude (Barkley, 1990).

Based on the early work of Kagan (1966), impulsivity is often defined operationally as rapid responding accompanied by excessive errors on matching to sample tasks. Impulsivity has also been defined as the inability to sustain inhibition, e.g. continued responding when requested to stop (Gordon, 1979), and to delay gratification (Rapport et al., 1986). Barkley (1990)

points out that inconsistency of findings in this area may be due to the fact that disinhibition is a central feature of hyperactivity and cannot be untangled operationally as a separate construct. He argues that inattention may be secondary to the primary disorder manifested by ADHD children, which he views as problems in the regulation and disinhibition of behavior.

Hyperactivity. The third manifestation of ADD is hyperactivity that is excessive and developmentally inappropriate. The most obvious characteristic in educational settings is inappropriate gross motor behavior (McKinney, Mason, Perkerson & Clifford, 1975; Schaefer, 1981). Children are perceived as "always on the go", which is displayed by "running around the classroom", "fidgeting", and "twisting and wiggling in one's seat." The behavior has a lack of control quality about it which is apparent to most adults and peers. The principal difference between clinically significant hyperactivity and normal elevated activity is the pervasiveness of the activity across different settings and its appropriateness given the environmental situation. While inattention is sometimes an invisible handicap, hyperactivity is highly visible and disruptive.

Research indicates that ADHD children are more active, restless, and fidgety than normal children at different times during the day and even during sleep (Barkley & Cunningham, 1979; Rapport et al., 1986). Also, several studies show that compared to children with other problems, the pervasiveness of hyperactive

behavior across situations at school and home reliably distinguishes hyperactivity in ADHD from that associated with other clinical conditions (Taylor, 1986).

Methodology

The goal of the Miami Center has been to develop a "reasonably exhaustive" and representative data base of original research articles. Since contemporary views and debate on the definition of ADD followed the publication of DSM-III in 1980 and its revision, we have elected to exclude (for the most part) pre-1980 publications. (Any exceptions have been included for specific reasons, e.g. the publication is included for historical purposes, it is the primary reference for an instrument that is still in use, it provides much-needed information, and/or there is little literature since 1980 on a given topic).

Our approach has been to start with extant bibliographies, specifically Barkley (1990) and Shaywitz and Shaywitz (1988). Additionally, we have conducted computer searches and index searches and have written to major authors requesting that they provide articles that are in press. The principal means for deciding what evidence will be included in the synthesis, what constitutes best evidence in a given case, and the grouping of studies with common design features has been use of a coding sheet to classify and describe the quality of evidence offered by each study we reviewed. Appendix A provides a more complete description of our methodological approach and the criteria we employed. Table 1 provides our overview of the results of our

search procedure.

As Table 1 shows, we have reviewed over 1,300 articles relevant to assessment and identification of children and youth with ADD. It is interesting to note that only a minor proportion (approximately 11%) of these articles have been located in educational publications. Obviously, only a sample of these articles is included in this final synthesis. We have selected articles for inclusion based on the criteria of quality and relevance.

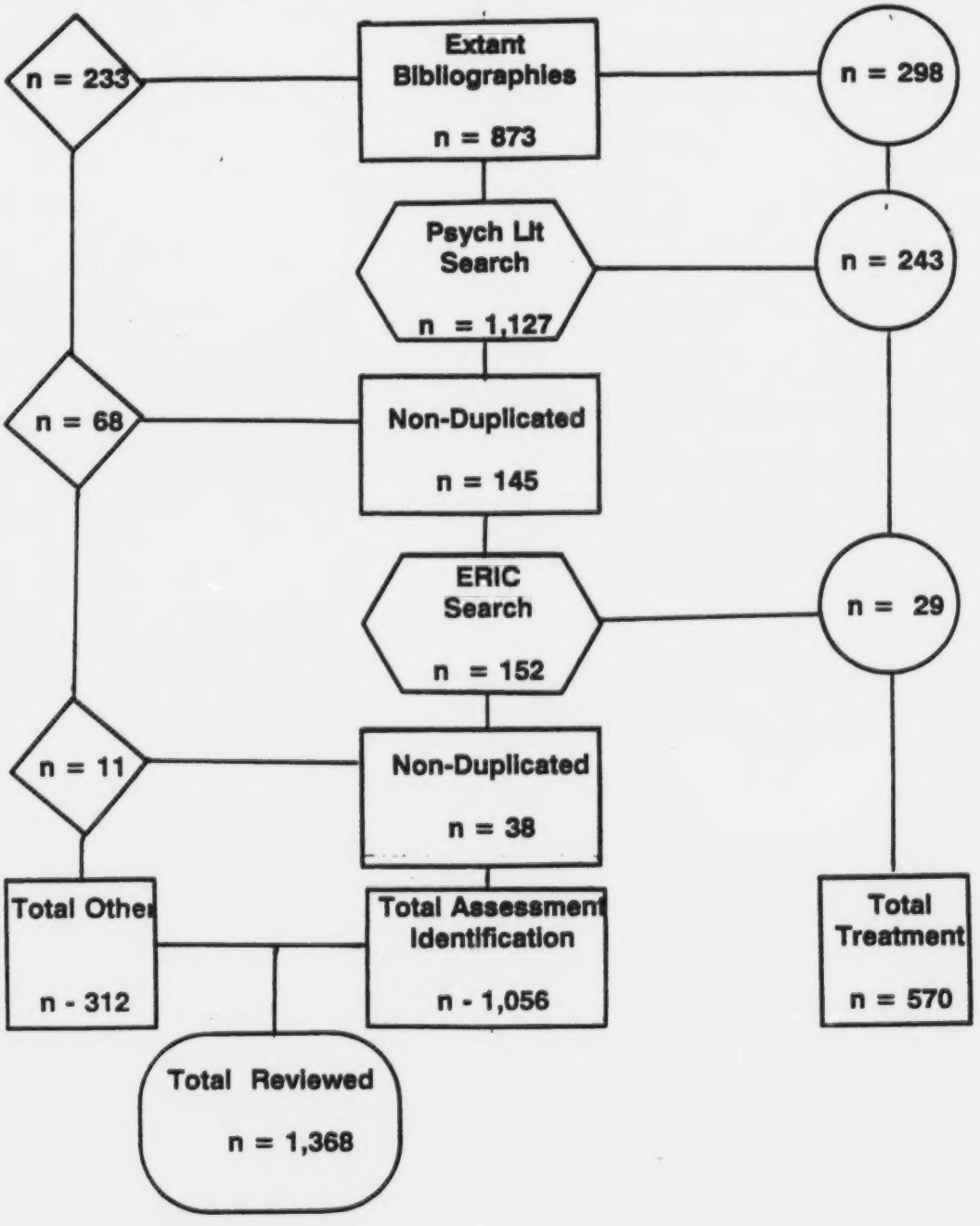
By quality we mean that the design of the study was appropriate for the question(s) being asked, the sample was of adequate size for the design and analysis, the dependent measures were reliable, the data analysis strategies were appropriate, and the overall conclusions were warranted. By relevance we mean that the articles contribute to the weight, degree of replication, and robustness of the evidence. In short, the articles have been used to detect emergent themes and patterns of evidence that are replicated with each successive case, building a logical argument for the validity of our conclusions.

The sources for the information we present may be found in two places: the references at the end of each section, and the tables displaying the information from referenced articles in the Appendix. Our findings and conclusions are based on our analysis and interpretation of the literature we have reviewed, and they may be found at the end of each major section or subsection.

TABLE 1

Total Non-Duplicated References by Sources

Other Relevant	Assessment/Identification	Treatment



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REVIEW OF INSTRUMENTS FOR ASSESSING ADD

This section provides an overview of the most common measures that are used to assess the symptoms of ADD for the purpose of identification. The most common method is parent and teacher rating scales. Observational measures, experimental laboratory tasks, and psychological tests are seldom used for identification purposes, but are recommended by many as a means for validating the diagnosis of ADD and studying variation in the manifestation of the symptoms of ADD as influenced by external factors and environmental conditions.

Instruments for Assessing Primary Characteristics

Although the Diagnostic and Statistical Manuals of the American Psychiatric Association (American Psychiatric Association, 1980, 1987) provide the most generally accepted definitions of ADD based on current research and clinical practice in the field of mental health, DSM diagnostic criteria have significant limitations when applied to educational assessment. For example, DSM III-R requires eight of fourteen symptoms as the threshold for diagnosis, and the severity of ADD is evaluated subjectively (many versus few symptoms above the threshold). Also, the same threshold and behavioral description of each symptom is applied to all age levels and to boys as well as girls which, given the wording, is likely to over-identify younger children and under-identify girls (who typically present fewer symptoms but may be as impaired educationally as boys).

Basically, DSM provides a categorical definition that

describes the primary manifestations of ADD in terms of the presence or absence of behavioral symptoms as opposed to a dimensional definition, which assesses the magnitude of deviance based on age-appropriate, representative norms on the populations of interest. Accordingly, a number of instruments have been developed with normative criteria to operationally define inattention, impulsivity and hyperactivity in a dimensional fashion for the purpose of identification. Some of these instruments are keyed to the behavioral symptoms of ADD described in DSM, while others assess the primary characteristics of ADD more generally with items and scales that do not correspond directly to those listed in DSM.

ADHD Rating Scale (DuPaul, 1991)

This scale was developed to gather teacher and parent ratings on the 14 symptoms specified in DSM-III-R. Parents and teachers rate each symptom (e.g., often fidgets or squirms in seat) on a 4-point Likert-type scale from "not at all" (0) to "very much" (3). This format permits the analysis of individual differences in the expression of the disorder and a quantitative determination of severity through the calculation of cut-off scores that include or exclude a child from the diagnosis of ADD at a given level of severity. DuPaul (1991) provides normative data for parent and teacher ratings for samples of 669 and 551 children, respectively, and for ages 6-12 years. Reliabilities reported for internal consistency and test-retest range from .90-.96. Interrater agreement between parents and teachers ranges

from .46-.59. The scale has construct validity and two factors (inattention/restlessness and impulsivity/ hyperactivity) which correspond to ADD with and without hyperactivity (Barkley, DuPaul & McMurray, 1990; DuPaul, 1991).

Swanson, Nolan, and Pelham Rating Scale (Swanson & Pelham, 1988)

This scale, known as the SNAP (after the authors), was developed (like the ADHD Scale) to collect quantitative ratings on DSM-III criteria for each of the three behavioral constructs and to classify ADD with and without hyperactivity. The instrument has adequate psychometric properties; that is, test-retest reliability coefficients from .66 to .92 were reported, with an average internal consistency of .90. Also, the scale has been evaluated for construct, concurrent and discriminant validity (Swanson & Pelham, 1988).

ADD-H Comprehensive Teacher Rating Scale (ACTeRS; Ullman, Sleator, & Sprague, 1984a, 1984b).

Like the SNAP, this instrument (ACTeRS) was based on DSM-III criteria for the purpose of assessing children and monitoring their response to treatment. Developed primarily through factor analysis, the ACTeRS has four subscales: oppositional behavior, attention, hyperactivity, and social problems. Norms are not reported by age or gender. Technical information regarding reliability and validity are available. Test-retest reliability ranged from .68 to .78, and internal consistency coefficients were .93 and .97 for factor scores. Interteacher agreement varied from .53 to .73. Although construct and discriminant

validity are available, concurrent validity with other instruments has not been reported.

Child Attention Problems (CAP; Barkley, 1988)

This 12-item scale, developed by Edelbrock, assesses only inattention and overactivity for the purpose of determining the effects of stimulant medication on children. Although the CAP has been shown to be sensitive to medication effects (Barkley, 1990), its psychometric properties have not been well evaluated. However, the CAP was derived from 12 items on the Child Behavior Checklist-Teacher Report Form (Edelbrock & Achenbach, 1984) and has normative data on 1,100 children. According to Barkley (1990), the Inattention Scale is relatively pure in that it seems unconfounded by items related to conduct disorder, affective disturbance, and overactivity.

Attention Deficit Disorders Evaluation Scale (ADDES; McCarney, 1989)

The ADDES has the largest and perhaps most representative normative sample of the instruments designed to measure the three DSM behavioral constructs separately. The School Version (McCarney, 1989b) contains 60 items, and the normative sample of 4,876 children and youth (ages 4 to 20 years) was drawn from 72 school districts in 19 states and based on ratings by 1,567 teachers. The Home Version (McCarney, 1989a) was normed on 1,754 children and youth from 4-20 years of age sampled from 12 states. The norms are evenly split by gender and approximate national census data on racial and socioeconomic composition. The

internal consistency and test-retest reliabilities of both versions are excellent, ranging from .85 to .97 with averages in the .90's. The range for interrater reliability among teachers is .83 to .90, and that among parents is .80 to .94. Construct validity was demonstrated via factor analysis. Concurrent validity with the ACTeRS was moderate, with correlations ranging from .57 - .64. Discriminant validity was established between children identified as ADD and normal, but discriminant validity for children with other conditions was not reported. In sum, the ADDES is a promising new instrument that appears to have considerable practical value for educational assessment. A nice feature in this regard is an Intervention Manual with behavioral objectives and recommended strategies that might be appropriate for pre-referral interventions or adapted for Individualized Education Plans (IEPs). Also, forms are available for documenting and evaluating pre-referral interventions.

Yale Childrens Inventory (YCI; Shaywitz, et al., 1986).

The YCI was developed by Shaywitz, Schnell, Shaywitz, and Towle (1986) to provide both a dimensional and categorical diagnosis of ADD and to screen for related behavior and learning problems based on parent ratings. In addition to Inattention, Impulsivity, and Hyperactivity, the YCI assesses Habituation (adaptability to changes), Tractability (manageability of behavior), Conduct Disorders (socialized and aggressive), Negative Affect (hurt, depressed), Academic Skills, Fine Motor, and Language. Subsequent factor analysis indicated that the 11

narrow-ban scales reduced to two broad-ban factors - behavioral and cognitive.

The YCI was designed for relatively young children, and the normative data were collected as part of the Connecticut Longitudinal Study, which followed 345 kindergarten children through grade four (Shaywitz, Holahan, Marchione, Sadler & Shaywitz, 1992). The school-based sample was drawn from two kindergarten classes in each of 12 towns stratified to represent six regional areas with 155 school districts. Fifty four percent of parents completed the YCI on all three occasions of measurement (grades K, 2, and 4). The sample size for boys and girls was 167 and 175 at grade K, 152 and 162 at grade 2, and 149 and 155 at grade 3, respectively. Shaywitz, et al., (1986) reported internal consistancy reliabilities that ranged from .72 to .93 across the 11 scales, with test-retest reliabilities from .61 to .89 and an average split-half reliability of .86 for like scales. Inter-rater reliability was not obtained.

Construct validity was established via factor analysis, and dicriminant validity was found for students with learning disability and normal comparisons. Shaywitz, Shaywitz, Schnell, and Towle (1988) reported correlations of .53, .52, and .48 between YCI ratings of attention, impulsivity and activity and the Conners Abbreviated Symptom Questionnaire (ASQ, see page 37). Teacher reported learning problems correlated with the attention, habituation, academic and language scales of the parent YCI as well as with a diagnosis of LD. Similarly, the attention,

activity, impulsivity and tractability scales were associated with receiving stimulant medication and reported home and school behavior problems, as well as with teacher ratings on the ASQ. In general, cognitive measures (WISC-R, reading and math scores) correlated consistently with the YCI attention, academic and language scales. Finally, Shaywitz, et al., (1988) found correlations that varied from .47 to .63 between the kindergarten YCI cognitive factors (attention, habituation, fine motor, academic, language) and grades in the fourth grade as well as psychologists' reports of receiving special education services; however, there were no significant correlations between academic outcomes and hyperactivity/impulsivity or other behavior problems.

Multi-Grade Inventory for Teachers (MIT; Agronin, et al., 1992)

The MIT is related to the YCI and, like the Yale, attempts to describe the relationship between ADD and LD based on teacher ratings (Agronin, Holahan, Shaywitz, and Shaywitz, 1992). The MIT was also developed as part of the Connecticut Longitudinal Study and used the same sample described above. The six scales were empiricially derived via factor analysis and include Academic, Language, Dexterity, Attention, Activity, and Behavior. Like the YCI, some items for the attention and activity scales were derived from DSM-III. Internal consistency reliabilities ranged from .79 to .95, but most were in the high .80s and .90s. Test-retest reliability ranged from .63 to .92, with most coefficients in the high .70s. Inter-rater reliability was not

obtained.

Construct validity was established via principal component analysis and tests for congruence. Concurrent validity was demonstrated by correlations between the MIT Attention, Academic and Language scales and comparable scales on the YCI. Also, these scales on the MIT correlated with the WISC-R IQ and scores on reading and math tests. The Attention, Activity, and Behavior scores of the MIT were intercorrelated appropriately with the Abbreviated Symptoms Questionnaire (ASQ) comparable YCI factors and with the Conners (see next section for a description of the ASQ). The pattern of correlations for predictive validity from grades 2 to grade 5 was similar and generally strong. Interestingly, as with the YCI, Attention predicted academic performance, whereas Activity and Behavior did not; but all three ADD factors predicted Conners ASQ scores over time. Discriminant validity was not reported.

Instruments for Assessing Situational Variation

Although situational variation can be assessed with observational measures (see below), it is cumbersome to gather observations in more than two or three settings. A more convenient means for assessing the pervasiveness of ADD symptoms is to obtain ratings of severity from parents and teachers as part of the screening and identification procedure, and then to seek convergent data from classroom observations using the procedures described below.

Two rating scales for this purpose were developed by DuPaul

and Barkley (1992).

The Home Situations Questionnaire-Revised (HSQ-R)

The HSQ-R asks parents whether their child has problems paying attention or concentrating in any of 16 situations at home (e.g. playing alone/with other children, watching TV, doing homework) and in public (e.g. visiting someone else's home/visitors in own home, at church, supermarkets/other public areas). If so, they are asked to rate the severity of difficulties from 1 (mild) to 9 (severe). Scores are derived for the total number of problem settings and the mean severity rating. Norms for the HSQ-R were based on a sample of 625 children (grade 1-8) who were randomly sampled from 45 schools in a single district (DuPaul & Barkley, 1992). The internal consistency coefficient was .93 for the total severity score, and test-retest reliabilities for the total problem score and severity ratings were .91 and .77, respectively. Moderate correlations (.49-.69) were obtained between parent ratings on the HSQ-R and the Abbreviated Conners Teacher Rating Scale (ACTeRS; see page 26) and ADHD Rating Scale as well as measures of on-task behavior and schoolwork completion (-.42 and -.47). Correlations with achievement measures were lower (-.30, -.34) for reading and language).

The School Situations Questionnaire-Revised (SSQ-R)

The SSQ-R has the same format and scoring as the HSQ-R, but the 8 items are specific to school settings (e.g. severity during desk work, small group activities, class discussions, video

presentations, free play, field trips). The normative sample was based on 502 children who were rated by general education teachers in the 45 schools that generated the HSQ-R sample. High internal consistency (.95) and acceptable test-retest reliabilities (.78 for problem scores and .88 for severity scores) were found. The correlations between the SSQ-R and the ACTeRS and ADHD rating scales were relatively higher for teachers than for parents (.70 to .80), and those with on-task behavior, work completion, and achievement were moderate (-.29 to -.48) but more consistently related than those for parents on the HSQ-R (DuPaul & Barkley, 1992).

Interrater reliability was not reported; however, the agreement between parents and teachers was .48 and .49 for the number of problem and severity scores, respectively. Additional studies on the reliability and validity of the HSQ and SSQ (original versions) can be found in Barkley and Edelbrock (1987). Also, in the latter article Barkley and Edelbrock discuss gender differences on the HSQ and SSQ in terms of what cut-off scores might be considered to be clinically significant for the number of problems and severity scores as dual criteria. At the same time, given the primary purpose of these instruments (i.e. to assess situational variance), it would be desirable to collect ratings on a randomly selected classmate from each teacher's classroom to evaluate the degree of deviance across the profile of situations for each child in relation to the standard deviations provided by DuPaul and Barkley (1992).

Multi-Factor Parent and Teacher Rating Scales

Some instruments have been devised to assess problem behavior and child psychopathology broadly. Typically these instruments are empirically based in that the items describe various problem behaviors experienced by children. The items are factor analyzed, and those that are highly associated with each other are grouped together to form a core description (symptom list) of the common behaviors displayed by children with a particular disorder.

In general, these instruments classify disorders more broadly into Internalizing (Emotional) problems such as anxiety, depression and withdrawn behavior and Externalizing (Behavioral) problems such as hyperactivity, aggression and antisocial behavior. The following are the most commonly used instruments for assessing problem behavior, including factors that reflect the primary manifestations of ADD.

The Conners Rating Scales

The Conners Scales are the most extensively used rating scales in the research literature on ADD. There are actually six Conners Scales: the original and revised parent and teacher rating scales (Conners, 1969, 1973, 1990) and two abbreviated scales that were derived from the original scale items to assess ADD specifically.

Conners Parent Rating Scales. The original Conners Parent Rating Scale (CPRS) contains 93 items and measures eight factors, including Conduct Problems, Fearful-Anxious, Restless-

Disorganized, Learning Problem-Immature, Psychosomatic, Obsessional, Antisocial, and Hyperactive-Immature (Conners, 1970). The revised (CPRS-R) parent scale, developed by Goyette, Conners and Ulrich (1978), contains 48 items and measures five factors: Conduct, Learning, Psychosomatic Problems, Anxiety and Impulsive-Hyperactive Behavior. The revised CPRS has norms on 570 children ages 3-17 years. In general, the reliability and validity of the CPRS-R has not been as well established as that for the original scale, which has a normative sample of 683 for children from 6 to 14 years of age. The bibliography for the Conners Scales (Conners, 1990) contains over 260 references, most of which are studies using the original CPRS 93 item scale. Although test-retest reliability is available and ranged from .40 to .70 for the CPRS, internal consistency reliability was not reported for either the CPRS or CPRS-R versions. On the other hand, interrater reliability between mothers and fathers was reported for the CPRS-R that ranged from .46 to .57 across scales, while that for the original scale averaged .85. While evidence for construct, discriminant, and concurrent validity is available from the bibliography on the original Conners Scales, the CPRS-R has reported only construct validity. Essentially, the CPRS-R measures a more limited number of internalizing problems than the original CPRS, which has led some (Barkley, 1990) to question its utility as an initial screening instrument.

Conners Teacher Rating Scale (CTRS). The original Conners Teacher Rating Scale (Conners, 1969), has one of the largest

normative samples (n=9,583) of the available multi-factor instruments, has well established reliability and validity, and has been used extensively for research on ADD as well as for clinical assessment. The well defined and replicated factors measured by the CTRS are: Hyperactivity, Conduct Problem, Emotional-Overindulgent, Anxious-Passive, Asocial, and Daydreams/Attendance Problems. The CTRS has 39 items and is normed for ages 4-12 years. Unlike the revised Parent Scale, there is an extensive literature that establishes reliability as well as construct, concurrent, and discriminant validity. The CTRS has reported test-retest reliabilities ranging from .72 to .91 across scales over a one month period; however, the long-term (one year) reliabilities are lower (.33 to .55). Interrater reliability has been reported to be as high as .9[illegible] in one study, but varies from .39 to .73 across scales in three other studies. Correlations between parent and teacher ratings on various scales have ranged from low (.23) to moderate (.45). With respect to validity, there are numerous studies to show that the CTRS correlates with other measures (especially the Quay-Peterson, 1975, Behavior Problem Checklist) and discriminates between a number of different clinical groups in addition to children with behavior problems and normals. Also, there are a number of studies which indicate that it is not only sensitive to the effects of stimulant medication, but behavioral and other treatments as well (Barkley, 1987, 1990; Conners, 1990).

Conners Teacher Rating Scale-Revised (CTRS-R). The CTRS-R is

a brief version of the CTRS that contains 28 of the original 39 items (Goyette, et al., 1978). Most of the items are the same as those on the original scale except those that reflect internalizing disorders. As a result, the CTRS-R measures only Conduct Problems, Hyperactive and Inattentive-Passive behavior. The reliability and validity of the CTRS-R is not extensive and is largely inferred from that established for the original instrument. While this instrument may be useful as a screening measure and for monitoring interventions for disruptive behavior, it does not seem to be particularly useful for assessing co-occurring emotional and behavior disorders comprehensively.

Abbreviated Symptom Questionnaire (ASQ). To identify hyperactive children and evaluate the effects of medication, Conners (1973) selected 10 items from the original parent and teacher scales which became known as the Hyperactivity Index. This scale was originally composed of the items that were endorsed most frequently by teachers. However, this scale did not tend to identify children with attentional problems (Ulmann, Sleator & Sprague, 1985), and more recent factor analysis suggests that the CTRS itself tended to identify children with overlapping hyperactivity and conduct disorders rather than those with hyperactivity and impulsivity as symptoms. In any event, the ASQ has been the most commonly used scale to assess the effect of stimulant medication.

IOWA-Conners Scale (Loney & Milich, 1982). Findings concerning the independence of ADD with hyperactivity and

aggression prompted the development of the IOWA-Conners Rating Scale. Loney & Milich (1982) identified empirically 5 items of the original CTRS that correlated with external measures of inattention and overactivity but not with external measures of aggression and, vice versa, 5 items that correlated with other measures of aggression but not inattention/overactivity. This allowed them to compute separate factor scores for the IO factor (inattention/overactivity without aggression) independently of the aggression factor. However, as Atkins and Pelham (1991) note, the aggression factor contains items such as "acts smart," "defiant" and "uncooperative" which appear to be more closely related conceptually to DSM-III-R oppositional/defiant disorder than aggression directed toward others. Also, Atkins, Pelham, and Licht (1989) found that while there was support in peer ratings for the IO factor, the correlation between the Aggression factor and peer rated aggression was poor. Normative data on the IOWA Conners is based on 608 children in grades 1-5. While it has high internal consistency and test-retest reliability, no interrater reliability is available, nor is there evidence for concurrent validity, although predictive and discriminant validity have been shown (Pelham, Milich, & Murphy, 1989; Atkins, et al., 1989). At the same time, it should be noted that the IOWA does not provide a measure of inattention apart from hyperactivity.

Child Behavior Checklist (CBCL)

The CBCL was developed by Achenbach and Edelbrock (1983) to

measure parent perceptions of childrens' behavior problems and social competence. Depending upon the child's age, the Behavior Problem Scale assesses 10-11 factors, including Social Withdrawal, Depressed, Immature, Somatic Complaints, Sex Problems, Anxious-Schizoid, Aggressive, Delinquent, Hyperactive, Uncommunicative, Obsessive-Compulsive. The Social Competence Scale provides information on participation in activities such as sports, social relationships with friends, participation in organizations, and school problems and performance. The Behavior Problem Scales contain 118 items, and the social competence scale contains 20 items, which makes the instrument somewhat laborious to complete compared to the Conners Parent Checklist and other instruments reviewed above. The normative sample of 1,300 children is stratified by SES and racial/ethnic composition, which is an appealing feature for educational assessment. Another excellent feature is that the items were evaluated for readability in a separate study (Harrington & Follett, 1984). The authors recommend that parents have at least a fifth grade reading level.

The CBCL has been studied extensively and is widely used in clinical settings to assess ADD and other childhood disorders. It has exceptionally high reliability (internal consistency, interrater and test-retest) and extensive evidence for construct, concurrent, predictive, and discrimant validity. Finally, another nice feature for diagnostic purposes is that the percentage endorsement of each item by parents is reported as an

index of symptom expression.

Child Behavior Checklist-Teacher Report Form (CBCL-TRF)

The teacher report form of the CBCL (Edelbrock & Achenbach, 1984; Achenbach & Edelbrock, 1986) is similar to the parent CBCL, but produces a somewhat different set of factors from teacher ratings which vary by age. In general, the factors assessed are Anxious, Social Withdrawal, Unpopular, Self-Destructive, Obsessive-Compulsive, Inattentive, Nervous-Overactive, and Aggressive. The CBCL-TRF also obtains teachers' impressions of the child's academic performance and general happiness. As noted, the factor structure and resulting clinical profiles change somewhat with age, which makes this instrument more developmentally sensitive than some others. The scales are normed on 1,100 children aged 6-16 years. As with the parent CBCL, the teacher report form has very acceptable internal consistency and test-retest reliability. The scales have excellent construct validity with respect to the broad dimension of internalizing and externalizing disorders and concurrent validity with the Conners Teacher Rating Scale. Also, they have been shown to distinguish between children who have ADD with and without hyperactivity (Edelbrock, Costello, & Kessler, 1984) and between children with learning disabilities and those with emotional disabilities (Harris, King, Reifler, & Rosenberg, 1984). Validity data on predicting external criteria and child outcomes was not available.

Revised Behavior Problem Checklist (RBPC)

This instrument was developed originally by Quay and Peterson (1975). The original Behavior Problem Checklist (BPC) was one of the most widely used teacher rating scales in research and the most commonly used instrument in special education for the identification of emotional and behavior disorders. The 36 item scale has norms on 24,997 normal children in schools (the largest sample on any one instrument used to assess behavior problems). The original BPC measured Conduct Problems, Personality Problems, Inadequate/Immature Behavior and Socialized Delinquency. Reliability and validity of all types was documented in numerous studies.

The RBPC (Quay, 1983; Quay & Peterson, 1987) expanded the original scale to include 89 items, which provided for a broader assessment on internalizing and externalizing disorders and included norms for both teacher and parents. The factors assessed are Conduct Disorder, Socialized Aggression, Behavior, and Motor Tension Excess. The latter factor, along with Attention Problems/Immaturity, is relevant to the assessment of ADD and has been shown to discriminate ADD with and without hyperactivity (Lahey, Schaughency, Strauss & Frame, 1984). Also, the RBPC discriminates between clinic and school referred children and among children with different categories of exceptionality in special education (Quay & Peterson, 1987). The RBPC also has been translated into Spanish. Reliability data are available on internal consistency, test-retest, and interrater

reliability for both teachers and parents that range from high moderate to high.

Summary and Conclusion: Rating Scales

In sum, the assessment literature on ADD contains a variety of rating scales that can be used to quantify the categorical diagnosis of ADD; however, these instruments vary in the primary behavioral constructs that are assessed and in how they are measured specifically. Also, the rating scales we reviewed varied greatly in the adequacy of their normative and psychometric properities. Some instruments were devised to operationalize DSM criteria for ADD (e.g. the ADHD Rating Scale and SNAP), while others used expanded pools of somewhat different items to measure the same behavioral constructs (e.g. the ADDES) and still others measured DSM symptoms, but added scales to assess multiple related factors (e.g. YCI and MIT). Finally, others were developed from the items that assessed conceptually similar contructs on established multi-factor instruments (e.g. Conners ASQ, IOWA and CAP).

In general, the abbreviated measures derived from established multi-factor instruments have the advantage of well estabilished norms and known psychometric properties; however, they do not measure all three ADD constructs equally well and thereby tend to identify children who are, for example, hyperactive but not necessarily inattentive or impulsive. On the other hand, the DSM keyed scales do not have extensive or nationally representative norms, and can be expected to vary with

changes in DSM criteria from time to time as DSM is revised. The ADDES scales has some significant advantages in this regard, but has not been well validated in the research literature. In sum, while any of the instruments we reviewed could be used to identify children as ADD, the advantages of any single instrument do not outweigh those of another instrument.

Accordingly, we concluded that for clinical and educational purposes, it is necessary to use multiple instruments from multiple sources to seek confirmatory evidence for the diagnosis of ADD and to identify children who manifest any or all of its primary characteristics (inattention, impulsivity, and hyperactivity) at an acceptable level of severity. In this regard, our review suggests that additional consideration should be given to the particular roles played by instruments designed to assess the primary characteristics of ADD on the one hand and those played by more established multi-factor instruments on the other.

Multi-factor instruments such as the CTRS, CBCL-TRF and RBPC have been used extensively in research and clinical practice. Although these instruments were developed to assess child psychopathology generally, they have also been used to screen and identify children and youth with ADD specifically. However, our review of the assessment literature on multi-factor, empirically based instruments suggests that they are perhaps less suited for the latter purpose than the former. Although the use of these instruments for the purpose of screening and identification can

be defended on the grounds that they are the best available from a psychometric perspective, they tend to identify children as ADD who also have other types of behavior problems because they are empirically derived. This assessment problem, referred to as "item contamination," confounds the measurement of the primary characteristics of ADD with those associated with other types of disorder.

For example, the hyperactivity factor of the CTRS also contains items which assess aggression and oppositional-defiant behavior that may co-occur naturally with hyperactivity in a significant number of cases, but not in all cases of ADD with hyperactivity. Similarly, neither the CTRS-R nor the RBPC provide an unconfounded measure of inattention, but rather assess inattention and passivity or immaturity. Also, none of the multi-factor instruments we reviewed provide a separate index for measuring impulsivity as a primary characteristic of ADD, although some contain items that factor with hyperactivity (e.g. the revised Conners Parent Rating Scale, Goyette, et al., 1978).

Accordingly, we concluded that while multi-factor instruments should be used as part of a comprehensive assessment of ADD, their primary purpose is to assess for co-occuring emotional and behavior disorders and provide additional confirmatory evidence for the validity of the diagnosis of ADD as assessed by other instruments that classify ADD specifically with respect to its primary characteristics and relevant subtypes. In this regard, multi-factor instruments can provide important

information about associated behaviors that reflect educationally and clinically relevant problems which may require differing types of interventions.

Observational Measures of the Symptoms of ADD

We identified seven observational instruments that provided behavior codes for assessing the symptoms of ADD in classroom settings. In general, most used an interval sampling procedure in which the occurrence of any or all the defined behaviors was checked if they were observed during the interval (e.g. 30 seconds). This procedure can be compared with a point time-sampling procedure in which only one behavior is coded at the end of a briefer interval (e.g. 5 seconds). We excluded studies that simply classified on-task or off-task or only recorded the occurrence of composite behaviors (e.g. disruptive behaviors) and studies in which the observer estimated the proportion of time the behavior was displayed based on passive observations over an extended period of time. We found no studies of symptom expression as a function on specific setting variables (e.g. whole class instruction, small group work, curriculum content, etc.). In most studies, the setting was described as "structured" or "unstructured," with no indication of the degree of adult supervision or group size, although broadly different school environments were varied in some studies (e.g. classroom vs. playground/recess).

Overview of Observational Measures

In the late 1970s several observational systems were

developed to code ADD symptoms in classroom settings. The Hyperactive Behavior Code (Jacob, O'Leary & Rosenblad, 1978) and the Classroom Observation Code (Abikoff, Gittelman-Klein, & Klein, 1977) were shown to discriminate children with ADD who were identified with the Conners Teacher Rating Scale (CTRS) from classmates without ADD. Also, Roberts (1979) developed a procedure for coding off-task, hyperactive, and aggressive behavior in clinic playroom settings that was found to discriminate children with ADD from ADD children with aggression and a psychiatric control group (Milich, Loney, & Landau, 1982). The following are examples of observational instruments that have been developed more recently to assess the symptoms and behavioral manifestations of ADD in educational settings.

Classroom Observation of Conduct and ADD (COCADD)

The COCADD (Atkins, Pelham, & Licht, 1985) was adapted from the Time Sample Behavior Checklist (Paul, Power, Engle & Licht, 1987) which contained 32 behavior codes scored in five domains (Position, Physical-Social Orientation, Vocal Activities, Non-vocal Activities, Play Activities). In the most recent version of the COCADD (Atkins, et al., 1989), 16 codes were derived from the original 32 codes, eight for classroom situations and eight for playground situations. The classroom observation codes were Attending, Overactive, Distracted, Verbal Disruptive, Verbal Off-task, Verbal and Physical Aggression, and Conduct (Stealing/Cheating). The eight playground codes included four classroom codes (Verbal, Disruption, Verbal and Physical

Aggression, Conduct) along with four play codes-High Active, Solitary, Parallel and Group Play. The COCADD uses a point time-sampling procedure with a 2-second interval, thereby resulting in frequent observations of extended periods of time. In Atkins et al. (1989), classroom observations were taken four hours/day over five consecutive days for 30 days, which resulted in 150 observations per child; and playground observations were taken over 10 daily observations to obtain 50 observations per child.

In addition to behavioral codes, childrens' desks were examined unobtrusively (Desk Checks procedure) and 13 items related to neatness and preparedness were coded. Neatness included such items as position of chair (under desk), trash on floor or desktops, and crumpled items/trash in desk. Preparedness items pertained to the presence of required books and supplies. Presumably these items reflect work habits and compliance with classroom rules. Finally, data was collected on academic work completed and percent correct on assignments to assess academic productivity.

Two studies have been conducted which used the COCADD to discriminate children with ADD from normal children and assess the relationships between teacher ratings and behavioral observations. Atkins et al. (1985) found that six out of 22 variables (9 COCADD, 11 Desk Check, 2 Academic) classified 85% of the cases as ADD or as normal defined by teacher ratings on the SNAP scale. False positive cases were less frequent than false negative cases. The most significant predictors of group

membership were attending, verbal intrusion and percent correct assignments. In the second study (Atkins, et al., 1989) COCADD variables and peer ratings were correlated with teacher ratings of Inattention/Overactivity and Aggression as separate factors derived from the IOWA Conners Scale. Evidence from both observations and peer ratings provided evidence for the validity of multiple measures of disruptive and inappropriate classroom and playground behavior with respect to teachers' ratings of different ADD behavioral constructs.

ADHD Behavior Coding System (BCS)

The ADHD-BCS (Barkley, 1990) is a modified version of the instrument developed by Roberts (1987) to observe ADD symptoms in playroom settings called the Structured Observation of Academic and Play Settings (SOAPS; Roberts, Milich, & Loney, 1985). The SOAPS codes childrens' behavior in restricted and free play situations (in the playroom through an observation window) and codes activity (number of floor grids crossed). The behaviors coded are: time spent out of seat, time on-task, number of attention shifts, restless/fidgety movements, and time vocalizing. The instrument, although not well suited for classroom settings, did show a high degree of reliability over a 2-year period and moderate correlations with parent ratings (Milich, et al., 1982).

Barkley (1990) modified the SOAPS to better operationalize the behavior codes, reduced the number of codes, and required a grade appropriate set of math problems to be performed in both

the clinic playroom and classroom settings (although the teacher can assign work from a current assignment for the day). The academic work should be sufficient to occupy 15-20 minutes. The child is instructed to stay in his or her seat although the playroom contains toys and the classroom has its usual distractors. The procedure also calls for the teacher to identify a normal child for comparative purposes who performs the same task for the same period of time.

The same behavior codes are used in both settings and include: (1) off-task (looking away from the task), (2) fidgeting (any repetitive, purposeless motion, e.g. squirming, shuffling feet, swaying, kicking, tapping with pencil on finger, etc.), (3) vocalizing (any noise or vocalization such as speech, whispering, humming/singing, odd mouth noise, clicking teeth, etc., (4) plays with objects (may touch clothing without playing with it, but not toys, curtains, adjacent desks or other objects in room except desk, materials, chair and pencil), and (5) out of seat (buttocks break contact with chair). Any or all behaviors are checked during a 30 second interval (in some studies 15-20 seconds) over a 15 minute observation period. Intervals are marked on an audio tape. Barkley (1990) recommends observing several periods over several days to sample sufficient behavior.

The ADD-BCS has been found to discriminate children with ADD from normals, but evidence is equivocal with respect to discriminating ADD with and without hyperactivity, and ADHD with and without aggression (Barkley, et al., 1990). Barkley (1991)

has recently reported low to moderate correlations between the ADHD-BCS behavioral categories and errors of commission on the Continuous Performance Task. Although low but significant correlation was obtained between ADHD total behavior scores on the ADHD-BCS and the Conners Hyperactive/Impulsive factor for parent ratings, the correlations for the Teacher Child Behavior Checklist hyperactivity factor were not significant in a large sample of 6-11 year olds. Only two of 30 possible significant correlations were significant between ADHD-BCS behavior scores and teacher ratings on five instruments (Barkley, 1991). While this instrument has promise for assessing ADD symptoms in school settings, it has not been evaluated for children in those settings extensively.

Child Behavior Checklist-Direct Observation Form (CBCL-DOF)

The CBCL-DOF was developed by Achenbach (1986) to code classroom and group behavior in other settings into categories that correspond to the broad factors assessed in the Child Behavior Checklist (Achenbach & Edelbrock, 1986). Scores are obtained for time on-task, total behavior problems, and total internalizing and externalizing problems. Also, factor scores were obtained using the 94 item pool for the normative sample of 287 children who were observed in classroom settings. The factors identified were Withdrawn-Inattentive, Nervous-Obsessive, Depressed, Hyperactive, Attention-Demanding, and Aggressive. The child is observed for 10 minutes. During the observational procedure the observer writes a narrative description of the

child's behavior and notes the occurrence, duration and intensity of the problem behavior. Each item is then rated on 0-3 scale. Zero indicates the behavior was not observed, and three indicates that it occurred with high intensity or greater than 3 minutes duration. At the end of each 10 minute period, the observer determines whether the child is on-task or not. Since children are observed for six 10-minute intervals, the raw score for on-task behavior ranges from 0 to 10. Observer agreement, concurrent validity with the CBCL and discriminate validity has been reported by McConaughy and Achenbach (1988) and McConaughy, Achenbach, and Gent (1988).

Structured Interviews

In general, two types of information that are relevant to the assessment and diagnosis of ADD are gathered from structured interviews. First, there are clinical interviews that were developed to yield DMS diagnoses of childhood disorders. Typically, this type of interview schedule contains a large number of questions concerning the specific symptoms of various disorders classified in DSM, along with questions pertaining to age at onset, duration of symptoms, and other information necessary to make a differential diagnosis that excludes or includes competing diagnoses.

An example of a published interview schedule of this type is the Diagnostic Interview Schedule for Children. The DISC-C for children and DISC-P for parents were developed by Costello, Edelbrock, Kalas, Kessler, & Klasic, (1982) and assess DSM-III

criteria for ADD, Conduct and Oppositional/Defiant Disrder, Anxiety Disorder (fears and phobias, obsessive-compulsive), Schizoid-Psychotic, and Affective (mood) Disorders (depression-affective, cognitive, suicidal). A later revised version that assesses DSM-III-R is the DICA-R (Diagnostic Interview for Children and Adolescents-Revised (Reich, Shayka, & Taibleson, 1992). This version (DICA-R) has separate interview schedules for children (age 6-12), adolescents (ages 13-17), and parents which assess somewhat different disorders, including ADHD, Oppositional-Defiant Disorder, Substance Abuse, Mood and Anxiety Disorders, Elimnination Disorders and Somatization, and Gender Identity Disorder. Also, the DICA-R contains questions about sociodemographic variables.

Most interview schedules that assess psychopathology broadly based on DSM or similar criteria have significant limitations (Edelbrock & Costello, 1984), particularily when viewed from an educational perspective. Most of the available instruments do not have normative criteria for determining the severity of symptoms and correcting for potental gender biases. Also, many of the available instruments were short-lived due to changes that occurred in the classification criteria from DSM-III in 1980 to DSM-III-R in 1987, and will require further revision with DSM IV in 1993. Also, some of these clinical interviews address socially sensitive issues (e.g. substance abuse) for children and adolescents as respondents. On the other hand, they do serve the purpose of involving older children and youth in the assessment

process, which is desirable since they have a stake in the decisions that are made.

The second purpose of using interviews in the assessment of ADD is to obtain information about current life and family circumstances, the child's developmental, social, educational and treatment history, and information about current behavioral and educational concerns. Examples of interview schedules that are attuned to the latter purposes are Barkley's (1990) ADHD Parent Interview and the Semi-Structured Clinical Interview for Children (SCIC; Achenbach & McConaughy, 1989).

The ADHD Parent Interview collects information on the reasons for referral, developmental history (prenatal, perinatal, infancy, preschool, and developmental milestones), as well as medical, treatment, school and family history. Also, information is obtained on current behavioral concerns and stressful events in the family. Finally, a checklist is provided for the symnptoms of ADHD, oppositional-defiant, conduct, anxiety, and depressive disorders that can be used to screen for associated problems (Barkley, 1990, pp. 261-177). The SCIC (Achenbach & McConaughy, 1989) was developed for chidren ages 6 to 11 years and asks about (a) activities, school and friends, (b) family relations, (c) self-perception and feelings, (d) fantasies, (e) parent-reported problems, (f) reading and math tests, and (g) screens for gross and fine motor problems. Child behavior during the interview is recorded. The self-report and interview data are then scored to assess eight scales including: Inept,

Unpopular, Anxious, Withdrawn-Depressed, Inattentive-Hyperactive, Resistant, Family Problems, and Aggressive. The SCIC, unlike other interview forms, was developed based on a clinical sample of 108 children, and the scales were empirically derived much like those measured by multi-factor instruments such as CBCL.

Summary and Conclusions: Interviews

In sum, when evaluated from an educational perspective, structured interviews with parents are an important part of school-based assessment procedures to gather information that is relevant to differential diagnosis and that cannot be obtained from rating scales. Interview data are often necessary to establish the age of onset and duration of symptoms and to gather evidence to suggest an intrinsic developmental problem as opposed to an acute reaction to situational stress or other environmental or health factor(s) that might produce behavior symptomatic of ADD. In the same vein, it is important to know how ADD is expressed in the home and community, not only for diagnostic purposes but also as a means for working with parents to support school-based interventions. In this regard, the interview is an opportunity to gain rapport with parents by communicating the school's concern for their problems at home as well as those that may be evident in school, and thereby promote more constructive involvement of parents in supporting their child's educational program.

DSM-keyed interview schedules (such as the DISC) that classify various disorders may be less useful for school

assessment purposes than the ADHD Parent Interview, given the availability of rating scales that accomplish the same purpose less expensively. Also, clinical interviews such as the DISC do not necessarily meet the objectives outlined above with respect to historical and current information that should be considered.

Experimental Measures and Tests of ADD Constructs

Measures of Attention

The Continuous Performance Task

The most commonly used laboratory measures for assessing vigilance and sustained attention are variations of the Continuous-Performance Task (CPT). In the typical study, children observe a screen which displays letters or numbers in predetermined sequence, and the child is told to press a button when a particular stimulus (or pair of stimuli) appears in the sequence. The stimuli are presented at a rapid rate (one per second) and performance is scored as the number of correct responses. Additionally, errors of omission (number of target stimuli missed) and errors of commission (responding to incorrect stimuli) are scored. It is generally assumed that errors of commission reflect both impulse control and sustained attention whereas the total correct responses and errors of omission each reflect sustained attention (Barkley, 1990; Douglas, 1983).

Although CPT performance has been shown to discriminate between hyperactive and non-hyperactive children consistently, its use in typical practice has been problematic due to the lack of standard procedures, representative norms, and cumbersome

equipment (Barkley, 1990). However, Gordon (1983) has developed a portable electronic testing device that administers a standardized CPT task. The child is required to press a button every time the number 9 appears when it is preceded by a 1. The digits appear for 200 msec at the rate of one per second over a nine minute period for the task. Sustained attention is measured by total correct responses and errors of commission, which are scored automatically by the device. The procedure also includes a distractibility task which is the same as the vigilance task except that a random set of numbers flash at random intervals on the periphery of the display. Performance is scored in the same fashion as the vigilance task.

As noted above, the CPT and in particular the Gordon Diagnostic System has been shown to discriminate children with ADD from those without ADD (Barkley et al., 1990; Gordon & Mettelbaum, 1988). However, in some CPT studies, hyperactive children made more errors of commission and in others made both more errors of commission and omission (Shaywitz & Shaywitz, 1988; Taylor, 1986; Douglas, 1983). Also, the CPT has been used extensively to evaluate response to stimulant medication, and has been found to be sensitive to both moderate and high doses (Barkley, Fisher, Newby, & Breen, 1988; Rapport, DuPaul, Stoner, & Jones, 1986).

One significant advantage of the Gordon Diagnostic System for assessing sustained attention is that it was normed on 1,266 non-referred children and has been shown to correlate moderately

with other laboratory tasks (Gordon & Mettelman, 1988). Also, performance was not correlated with parent SES, gender or IQ in the standardization sample, but has a moderate association with age, which varied from 4-16 years.

Finally, several software programs have been developed for personal computers to administer and score CPT tasks; however, very little research has been performed on the utility of their applications for research and practice (Conners, 1985; Klee & Garfinkel, 1983).

Cancellation Tasks

Cancellation tasks are basically paper-and-pencil continuous performance tasks. In these tasks children visually scan letters, numbers or shapes across rows that are printed on sheets of paper. For example, in the Children's Checking Task, the child is given a 5 page book with 15 numbers printed in 16 rows on each page. The child is asked to draw a line through each number as it is either read or presented on an audio tape (at a rate of one number per second). Generally, there are 14 discrepancies per page in which the number read does not match the number in the series. As with the CPT, the task is scored for the number correct, number of missed discrepancies (errors of omission) and number incorrect (errors of commission). The CCT has been found to correlate modestly with teacher ratings (Conners Scale) and measures of impulsivity (Brown & Wynne, 1982; Keogh & Margolis, 1976).

WISC-R Freedom for Distraction Factor

Factor analysis of the Wechsler Scales for Children-Revised (WISC-R) has often yielded a fourth factor in addition to the general intelligence, verbal and performance factors. This factor is usually defined by secondary loadings on the digit span, arithmetic, and coding subtests which also load more strongly on the general, verbal and performance factors. Nevertheless, this factor has been widely accepted in clinical practice as an index of freedom from distractibility (Kaufman, 1980), and has been used as a clinical measure of ADD because it presumably reflects attentional process. However, this practice is contrary to the conceptualization of these measures as indexes of short-term memory, arithmetic, visual-spatial and motor skills. Moreover, the evidence for the discriminant validity of the measure is equivocal at best with respect to research on ADD children (Milich & Loney, 1979; Milich & Kramer, 1985; Werry, Elkind, & Reeves, 1987). Also, the factor scores show little to no correlation with other attentional measures (Brown & Wynne, 1982; Klee & Garfinkel, 1983). Recently, Barkley et al. (1990) found that scores on the Freedom from Distractibility factor failed to distinguish children with ADD who were hyperactive from those who were not hyperactive. Accordingly, we agree with others (Barkley, 1990; Feagans & McKinney, 1981; Ownby & Matthews, 1985; Steward & Moely, 1983) that there are significant problems in drawing inferences about distractibility from these subtests on the WISC-R and/or using such evidence to support the

diagnosis of ADD.

Measures of Impulsivity

Matching Familiar Figures Test

Although errors of commission on a Continuous Performance Test are assumed to reflect impulsive responding, the most common measure of impulsivity in research studies is Kagan's (1966) Matching Familiar Figures Test (MFFT). The MFFT is a 12-item matching-to-sample task in which the child is shown a target picture (e.g. a chair) and six similar pictures and is asked to identify the matching picture. Response latency is measured as the mean time to initial response, and response accuracy is the total number of errors in picture identification. Kagan (1966) noted that latency and errors were correlated; and he devised a double median-split procedure for classifying random samples of children into reflective (slow and accurate) and impulsive (fast and inaccurate) subgroups, thereby linking impulsivity (fast responding) to poor performance on a variety of problem-solving tasks and academic achievement (McKinney, 1975).

Although the MFFT has been widely used, findings have been inconsistent with respect to reliability (Egeland & Weinberg, 1976) and its ability to discriminate ADD children from normals (Barkley, et al., 1990; Milich & Kramer, 1985; Werry, et al., 1987). Nevertheless, perhaps the most important issue with the MFFT concerns what it purports to measure (Douglas, 1983, McKinney, 1975; Haskins & McKinney, 1976; Milich & Kramer, 1985). Haskins and McKinney (1976) found that when response latency and

errors on the MFFT were entered in a backward elimination regression model to predict problem-solving efficiency and achievement scores, only the error variable predicted and completely consumed the variance contributed by latency scores. Moreover, the principal difference between reflective and impulsive children was in their ability to generate effective problem-solving strategies (McKinney, 1975), which, when acquired, eliminated initial performance differences between reflective and impulsive children (McKinney & Haskins, 1980). Moreover, there are children who are fast and accurate as well as slow and inaccurate who also complicate the interpretation of the latency variable as a measure of impulsivity. In sum, the MFFT, although widely used, may be flawed conceptually with respect to assessing impulsivity as displayed by children with ADD and has produced conflicting findings in the literature.

Response Delay Tasks

Response Delay Tasks require the child to wait before responding to receive reinforcement. A novel variation of this task for preschool children is the Cookie Delay Task used by Campbell and her colleges in their longitudinal studies (Campbell, Szumowski, Ewing, Gluck, & Breaux, 1982). The child was instructed to watch as the investigator hid a cookie under one of three cups and then wait until the investigator rang a bell before finding it. Delay intervals from 5-45 seconds were randomized over 6 trials. Impulsive responses were scored if the child picked up the cup and/or ate the cookie during the delay

interval (several children also pushed the investigator's hand to ring the bell during the delay). Good delays were recorded when the child waited regardless of whether s/he chose the correct cup first. Correct responses required both the delay and correct first choice. Campbell, et al. (1982) found that problem children (referred by parents and rated as hostile, anxious or hyperactive on the Behar, 1977, Preschool Behavior Questionnaire) had more impulsive responses and fewer good delays and correct responses than non-referred control children.

A more sophisticated and well standardized Delay Task was developed by Gordon (1983) for the CPT device described above. In this task the child is told to press the button, wait awhile, and then press the button again. If s/he waits six seconds, a light signals a reward which accumulates on the counter display. If the child responds during the delay interval, the counter resets and no reward is displayed. The device scores performance automatically and yields the total number of responses, the number of correct responses, and the ratio of the two (efficiency index). The Delay Task of the Gordon Diagnostic System (GDS) is normed on the same sample of 1,266 children ages 4-16 years. Gordon and his colleagues found that the Delay Task discriminated children with ADD from normal children, had moderate test-retest reliability over a year, and correlated with parent and teacher ratings (Gordon & Mettelman, 1988; McClure & Gordon, 1984). However, Barkley, et al. (1988) found that it correlated poorly with parent and teacher ratings and was not sensitive to

stimulant drug effects. Since the GDS and other computer applications are relatively new devices, they are not widely used and await further research for adequate evaluation.

Measures of Activity

A number of devices such as actometers, pedometers, and stabilometric cushions have been used to assess childrens' motoric activity directly. Generally, these devices are used primarily for research purposes rather than for clinical evaluation to assess situational variability in hyperactivity and to validate ratings and observational data. Reliability of direct measures of activity has been difficult to establish, and these measures often have poor correlation with other measures based on ratings and observation (Barkley & Ullman, 1975; Milich, et al., 1982). Other authors have noted that these measures of activity lack normative data, fail to provide information about the qualitative aspects of activity level, and have a number of practical limitations in authentic settings (Guevremont, DuPaul, & Barkley, 1990; Porrino, Rapoport, Behar, Sceery, Isomond, & Bunney, 1983; Shaywitz & Shaywitz, 1988).

On the other hand, these methods may be particularly useful in assessing situational variation between the activity levels of children with and without ADD in different classroom, playground, and home settings in response to different environmental demands. For example, several studies show that while hyperactive children move more than normal controls overall, they differ primarily in structured classroom settings rather than less structured free

play, lunch and recess settings, which is consistent with evidence from observational and rating measures (Barkley & Ullman, 1975; Zentall, 1985). However, other studies provide alternative evidence that children do display inappropriate behavior during unstructured time. For example, the only discriminator on the HSQ and SSQ between boys and girls with ADD was that boys displayed more problem behaviors during unstructured class time (Breen & Altepeter, 1989). Additionally, preschool children with behavioral problems were overly active in free play settings in a study by Campbell and colleagues (1982). Accordingly, the effects of age and situational variation on these measures is not well known. Nevertheless, these methods of measuring activity may be an option in preschool settings when developmentally appropriate norms are not available by assessing deviance from peer behavior.

Summary and Conclusion

Generally, laboratory tasks have been used for three basic purposes with respect to the assessment of children with ADD. The first is to seek convergent external validity for the diagnosis of ADD in individual cases. In general, when evaluated for this purpose, the bulk of commonly used instruments and measures are inadequate with respect to the availability of representative norms, reliability, validity and specificity in the identification of children with ADD who were classified based on other measures. However, an exception to this conclusion is the Gordon Diagnostic System (Gordon, 1983).

At the same time, as Barkley (1990) noted, the apparent objectivity of hard data (e.g. mean time and error rates) is seductive to those who must rely on clinical judgement as well as to those who dismiss the diagnosis of ADD based on rating scales as subjective. In our view, the latter is not the case based on the literature and our experience, and we would conclude that (a) experiment tasks and single-dimensional measures are not well suited for this purpose of assessment and (b) such tasks are not particularly useful and often cumbersome in typical school practice when more reliable methods are available from a purely psychometric perspective. However, this conclusion does not imply that such measures are not useful for other purposes.

The second purpose is to assess the validity of the ADD behavioral constructs themselves. However, as Douglas (1983) and Shaywitz & Shaywitz (1988) have argued, attention is a multidimensional construct with interactive components including (a) the regulation of arousal, (b) the selection of salient features of the environment to invest attentional effort, (c) the maintenance of attentional effort to achieve adequate task performance, and (d) the inhibition of impulsive, careless responses during task performance. Also, as Barkley (1990) has argued, the latter construct - inhibition or impulse control- with regard to rule governed behavior is essential to the conceptualization of ADD.

Our review of the literature suggests that the evidence for the validity of ADD behavioral constructs is not well established

to date as assessed by laboratory measures and specific psychological tests of attentional processes and impulse control. The evidence is stronger with measures of sustained attention and tasks that require the child to delay responding to receive reinforcement. While this body of evidence is more consistent than not, it raises the issues of whether all the relevant dimensions implied by the theoretical construct of attention can be measured experimentally.

Finally, observational measures are uniquely suited to assess situational and temporial vairation in the expression of inattention and hyperactivity. Unfortunately, these types of measures are seldom used for this purpose in the resarch literature on ADD. Yet, this type of information is important from the perspective of educational assessment not only to establish the pervasiveness of a child's symptoms, but also to guide educational planning with respect to the scheduling of certain learning activities over the school day and anticipating when and with what tasks behavioral methods to support instruction are needed most.

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EDUCATIONAL CHARACTERISTICS, ADD SUBTYPES, AND COEXISTING DISORDERS

Over the past two decades, researchers and practitioners have engaged in ongoing debates about the characteristics or markers of ADD, its various subtypes, and its coexistence with other disorders. With acknowledgement of the history of these debates, in this section we provide an overview of relevant issues as well as a synthesis of selected research studies pertaining to (a) educational characteristics of children with ADD and ADD subtypes, (b) the overlap of ADD with other learning and behavioral disorders, and (c) the prognosis for children with ADD. Several conclusions are drawn from this knowledge base, and the implications of this research for educational classification of children with ADD are discussed. To provide a framework for the discussion, the following three questions are posed:

1. Do individuals with ADD comprise a homogeneous, unitary group?
2. What are the educational, behavioral, cognitive, and social-emotional characteristics of ADD?
3. What are the long-term effects of ADD?

ADD Subtypes

Generating the greatest amount of debate in the field have been the issues surrounding ADD subtypes. A review of the changes in diagnostic criteria for ADD published by the American Psychiatric Association (DSM-II, 1968; DSM-III, 1980; DSM-III-R, 1987) (see the introduction to this synthesis) as well as the

forthcoming DSM-IV criteria for ADD underscores the problem of conceptualizing and operationalizing this syndrome. Researchers and clinicians have struggled to delineate the parameters for classifying children as ADD given the multiple symptoms associated with this condition. DSM-III differentiated two subtypes of ADD based on the presence or absence of hyperactivity symptoms (ADDH and ADDnoH). Some years later, DSM-III-R complicated the issue of subtypes by combining ADDH and ADDnoH into a single syndrome, attention deficit-hyperactivity disorder (ADHD). Based on the cumulative support for the existence of subtypes (e.g., Barkley, DuPaul, & McMurray, 1990; Berry, Shaywitz, & Shaywitz, 1985; Dykman & Ackerman, 1991; Goodyear & Hynd, 1992; Edelbrock, Costello, & Kessler, 1984; Halperin, Newcorn, Sharma, & Healey, 1990; Hynd et al., 1991; Lahey & Carlson, 1991; Newcorn, Halperin, Healey, & O'Brien, 1989), DSM-IV will return to the conceptualization of ADD (as presented in DSM-III) as distinct subtypes (ADDH and ADDnoH) and will clarify the differences between the subtypes (Epstein, Shaywitz, Shaywitz, & Woolston, 1991).

Further complicating this issue, however, is the disagreement in the field regarding the existence of a subset of individuals who may be termed "pure hyperactive" (August & Stewart, 1982; Lahey, personal communication, December, 1992; Trites & LaParde, 1983) or ADD with hyperactivity and aggression (Dykman & Ackerman, in press). Research in ADD, while providing information about the syndrome, in some ways has been more

confusing than clarifying because of methodological problems that seem to prevail in investigations of ADD. For example, the majority of studies have used clinic-referred samples. This practice creates a bias that limits the generalizability of results to a population of youngsters who are relatively severely involved (Epstein et al., 1991). These youngsters may present more behavioral problems than non-referred children, thus leading to an overrepresentation of subjects with conduct problems and a skewing of prevalence rates for certain symptoms.

Another issue that is only beginning to be addressed in the literature is the suspected underidentification of girls with ADD. Unfortunately, most of the research conducted in ADD has focused exclusively on males or has employed predominately male samples. As a result, we have only a limited understanding of the manifestations of ADD in girls. Because boys typically display more behavioral problems in school, they may be referred and identified more often than girls (Breen & Altepeter, 1990). Livingston, Dykman, and Ackerman (1990) indicated a referral rate of 5 boys to 1 girl with 25% of the boys in their clinic-referred sample (n=153) rated as hyperactive and aggressive.

The heterogeneity of the population is often overlooked in sample selection, which results in overlapping diagnoses and further compounds the problem of generalization of results. Other confounding variables that often are neglected in these investigations are possible IQ differences, record of medication, and the approach the researcher uses to identify subgroups within

the ADD sample (Goodyear & Hynd, 1992). There are concerns over measures such as the Conners scales that are frequently used to identify subgroups of students for research purposes (Brown, 1986; Ullman, Sleater, & Sprague, 1985). In sum, use of different operational criteria from study to study, overlapping of symptoms between subgroups and within definitions, reliance on a single instrument rather than a multimodal behavioral assessment for diagnosis, confounding of dependent and independent variables, and reliability of diagnoses make interpretation and generalization of research findings tenuous (Goodyear & Hynd, 1992). With these concerns in mind, we reviewed 57 studies published since 1980. This research represents a significant proportion of the literature base on identifying characteristics of students with ADD and defining subgroups of children with ADD.

Research in Learning Characteristics

Table 1 in Appendix B presents a representative list of studies that provide data on educational, behavioral, cognitive, and social-emotional characteristics of children with ADD. Findings from studies on ADD in which ADD subgroups may or may not be differentiated with respect to hyperactivity are summarized in the next section.

Generally, students with ADD have more grade retentions, receive poorer grades in academic subjects, are placed more often in special classes, and receive more tutoring than nonidentified students (Biederman, Newcorn, & Sprich, 1991). In addition to

grade failure, children with ADD are also more likely to be suspended or expelled from school (Barkley, 1990). They work less hard, behave less appropriately, and learn less in their classes than nonidentified children (Edelbrock, et al, 1984). Interestingly, Milich and Okazaki (1991) found that although children with ADD exhibited learned helplessness, they attributed their failure to a lack of effort.

Inattention and Learning Strategies

Inattention is generally an overriding characteristic of children with ADD (August & Garfinkel, 1989; Barkley, et al., 1990; Edelbrock, et al., 1984; King & Young, 1982; Kuehne, Kehle, & McMahan, 1987; Zentall, in press). Three studies addressing problem-solving ability found students with ADD to be less efficient problem solvers than both average and reading disabled students (Tant & Douglas, 1982), less likely to use organizational strategies under effortful conditions (Voelker, Carter, Sprague, Gdowski, & Lachar, 1989), and less able to verbalize instructions regarding strategy use than normal controls (Hamlett, Pelligrini, & Conners, 1987). These findings suggest that attentional problems may have a detrimental effect on executive processing by interfering with strategy production and allocation during academic tasks that require problem-solving ability.

Zentall (1990), in her studies of the interaction of attention and academic performance, concluded that students with ADD may be more likely to use social and kinesthetic learning

styles compared to normal students (Zentall & Smith, 1992) and that attention to detail in an initial exposure to a difficult academic task may be counterproductive for hyperactive children (Zentall, 1989). She suggests using self reports of students to determine learning style and then accommodating children's style preferences (low vs. high stimulation) during instruction.

Social Variables and Learning

Nussbaum, Gran, and Roman (1990) found that ADD children were perceived as more aggressive and abusive in social situations, which may account for their unpopularity with peers (Carlson, Lahey, Frame, Walker, & Hynd, 1986; King & Young, 1982). In a study focusing specifically on the nature of peer interactions, the type of social situation significantly affected the quality of the ADHD child's response (Grenell, Glass, & Katz, 1987). Structured work situations seemed to be the most troublesome social situation for children with ADHD. These authors also found that students with ADHD did not differ from peers in their knowledge of strategies for initiating relationships, but were less friendly and effective in maintaining relationships and less friendly as well as more impulsive and assertive in conflict situations than peers.

In contrast, the findings of Landau and Milich (1988) support a more cross-situational perspective of ADD behavior. These authors found that boys with ADD seemed to adopt a specific response strategy and then apply it relatively independent of task demands. They concluded that these children may not be able

to attend to or make use of salient social or environmental cues. Additionally, in support of the Grenell, Glass, and Katz (1987) study, they found that ADD children appear to have a social performance rather than skill deficit. Another interesting finding of Landau and Milich that warrants further investigation is that children with ADD seem to elicit compensatory or controlling behaviors from partners in social situations.

Gender Differences

Although both boys and girls with ADD are characterized by poor peer relationships, girls seem to have fewer impulsivity and behavioral problems than ADD/H boys, but more than nonidentified girls (deHaas, 1986; Milich, Loney, & Roberts, 1986). Compared with normal girls, girls with ADD have a shorter attention span and less concentration (deHaas, 1986). Girls with ADD seem to be a more homogeneous group than boys with ADD and may be characterized more by their cognitive deficits than behavioral disturbances (Ackerman, Dykman, & Oglesby, 1983; Berry, et al., 1984). Ackerman, Dykman, and Oglesby (1983) suggested that the underlying cognitive deficits associated with reading disability may be gender-related. Sequential memory correlated with reading ability for boys, whereas verbal IQ correlated with reading ability for girls. However, two research studies of gender differences have found minimal academic, behavioral, and situational differences among children with ADD (Breen, 1989; deHaas & Young, 1984). Researchers have suggested that different criteria or norms may be necessary for accurate and early

identification of girls with ADD (Berry et al., 1984).

ADD Subtypes and Educational Characteristics

There is also considerable literature about the differing educational characteristics of subgroups of ADD children. Halperin et al. (1990) noted a difference between subtype groups in that ADD/WO children tended to have more cognitive (attentional) problems than students with ADD/H, who, in turn, demonstrated more conduct problems. Lahey, Schaughency, Frame, & Strauss (1985) described ADD/H children as more irresponsible, distractible, and impulsive than their ADD/WO peers, who were found to be more sluggish and slower than the other group. In a study comparing ADD/H and ADD/WO boys, a much higher rate of retention was found for ADD/WO than ADD/H (71.5% compared with 16.7%), suggesting that children who are ADD but do not manifest symptoms of hyperactivity are at greater risk for academic failure (Lahey, Schaughency, Hynd, Carlson & Nieves, 1987).

Hynd and colleagues (1991) and Carlson, Lahey, and Neeper (1986) found that underachievement, particularly in mathematics, characterizes ADD/WO children compared with ADD/H children, although Frick, Kamphaus, Lahey and Loeber (1991) found no differences in clinic samples of ADD/H and ADD/WO children with respect to ability and achievement discrepancies. Difficulty in mathematics experienced by these children may be partly attributable to their failure to automatize number facts, a characteristic that also seems to be related to attentional problems (Ackerman, Anhalt, Dykman, & Holcomb, 1986; Zentall,

1990).

Despite the problems cited in regard to research issues, it is nevertheless clear from the studies reviewed that children with ADD experience educational, behavioral, cognitive, and social-emotional problems that interfere with school performance and interactions with peers and adults. The following section addresses the coexistence of ADD with learning disabilities (LD), oppositional defiant disorder (ODD), conduct disorder (CD), and affective disorders, which may further exacerbate the school and personal difficulties facing children with ADD.

Coexistence of ADD with Learning and Behavioral/Emotional Disorders

The independence of ADD, learning disabilities, oppositional and conduct disorders, and mood and anxiety disorders in children has been a much debated topic in the field. Although support is accruing for conceptualizing coexisting conditions as distinct entities (e.g., August & Garfinkel, 1990; Felton, Wood, Brown, Campbell, Harter, 1987; Goodyear & Hynd, 1992; Milich, Widiger, & Landau, 1987; Shaywitz & Shaywitz, 1991), other positions have been proposed. These include viewing coexisting disorders as expressions of the same disorder, as sharing common genetic or psychosocial vulnerabilities, as distinct subtypes within a larger heterogeneous disorder (e.g., ADHD with CD as a subtype of ADHD), or as precursors or early manifestations of later psychiatric disorders such as conduct or mood disorder (Biederman, et al., 1991). Nonetheless,

approximately half of clinic-referred children with ADD both with and without hyperactivity also qualify for other DSM diagnoses (Lahey & Carlson, 1991).

The high prevalence rates for the coexistence of learning, behavioral, and emotional disorders, while varying considerably across research studies, suggest that children with ADD experience a variety of other difficulties associated with these other conditions. Research is beginning to document that these combinations of disorders place children at greater risk for later social, emotional, and psychological difficulties (Biederman, et al., 1991). Because school failure is associated to a varying degree with learning, behavioral, and emotional disorders, the identification of these disorders in children and provision of appropriate interventions are vital concerns of educators. However, as Biederman, Newcorn, and Sprich (1991) pointed out, we still do not know whether school failure of children with ADD is related to the "psychiatric picture of inattention and impulsivity (ADHD), cognitive deficits (LD), a combination of both factors (ADHD plus LD), or perhaps other factors such as social disadvantage or demoralization and consequent decline in motivation" (p. 572).

Several issues associated with the coexistence of ADD and LD and ADD and CD that are specific to school performance need to be addressed (Goodyear & Hynd, 1992). For example, is ADD/WO, not ADD/H, the most frequent co-occurrent of learning disabilities, as research may suggest? If so, then what are the specific

educational manifestations of the combination? Also, if ADD/WO and LD are linked primarily as a consequence of underachievement associated with both conditions, then what is the relation between ADD/H and academic underachievement? If ADD/H is connected more to ODD and CD, and underachievement is also correlated with these behavioral conditions, then specifically how should instructional programming vary as a function of the disorder(s)? These questions have serious implications regarding identification and intervention for children and adolescents with ADD. The co-occurrence of disorders in independent selected non-referred samples is largely unknown.

Research in ADD and LD

Table 2 in Appendix B presents a representative list of research studies that have focused on the association between ADD and LD. Children identified as ADD are usually referred to clinics and are given a psychiatric evaluation and diagnosis based on DSM criteria. In contrast, children identified as learning disabled are usually school-identified through an educational and psychological evaluation. These children must meet criteria that include a significant discrepancy between ability and achievement in one or more academic areas and evidence of a processing dysfunction that may adversely influence academic performance. Most reported prevalence statistics are based on research using clinic-referred samples, which may be misleading if applied to school populations. With this caveat in mind, we can estimate the prevalence of LD in children with ADD

to be at least 10%, while the prevalence of ADD in children with LD has ranged from 15% to 80% (Barkley, 1990; Epstein et al., 1991).

The nature of the association between the disorders is not yet clear. Indeed, disagreement regarding the distinction of the disorders is well acknowledged. For example, Dykman and Ackerman (1991) found that 50% of an ADD sample had reading disability, while August and Garfinkel (1990) found that 39% of their ADD sample were impaired in reading. Whereas Dykman and Ackerman (1991) concluded that the students with reading disability were characterized by phonological sensitivity problems, August and Garfinkel (1990) did not find specific cognitive deficits to be associated with reading disability. In support of this view, Halperin, Gittelman, Klein, & Rudel (1984) and Carlson, Lahey, and Neeper (1986) indicated no clear distinctions between ADD children with and without reading disability. However, two other studies found a clear separation of ADD and reading disability effects (Felton et al., 1987; Felton & Wood, 1989). In these studies, memory deficits and rote verbal learning problems were associated with ADD, while recall problems and phonemic awareness were associated with reading disability.

Based on their work, Cantwell and Baker (1992) suggested that speech and language disorders may be a common background factor to both LD and psychiatric disorders, and in particular to ADD. Forness, Youpa, Hanna, & Cantwell (1992) studied classroom characteristics of boys with ADD with and without conduct

problems and found that between 6% and 15% of the sample (N=71) qualified for a learning disability diagnosis. They argued that underachievement in mathematics, often characteristic of students with emotional and conduct disorders, also characterizes students with ADD/WO as well as students with visual-perceptual learning disabilities. Students identified as ADD/H and LD in a study by Tarnowski and Nay (1989) exhibited the highest degree of external locus of control, a finding that may relate to the coexistence of ADD with LD. Sorting out the salient characteristics and defining the condition based on these characteristics is problematic both for the researcher and the practitioner. Effective intervention depends on the identification of specific problems associated with the condition rather than simply a diagnosis.

Research in ADD and Behavioral Disorders

Table 3 in Appendix B presents a representative list of research studies that focused on the association between ADD and oppositional defiant disorder (ODD) and conduct disorder (CD). Along with ADD, ODD and CD are clustered into a supraordinate diagnostic category in DSM-III-R, which is termed Disruptive Behavior Disorders. These disorders share common attributes such as being disruptive of social situations and impinging substantially on the social conduct, activities, and rights of those around them (Barkley, 1990). The diagnostic criteria for ODD include (a) a disturbance of at least six months during which at least five symptoms are present, e.g., often loses temper, often argues with adults, often actively defies or refuses adult

requests or rules, often blames others for his or her own mistakes; and (b) does not meet criteria for other disorders such as CD, psychotic disorder, or manic episode. The primary feature of CD is persistent patterns of conduct that violate major age-appropriate societal norms, including honoring the rights of others. Three types of CD include (a) Group Type, (b) Solitary Aggressive Type, and (c) Undifferentiated Type.

The research with children with ODD and CD has historically been conducted with clinic-referred males. The prevalence rates, however, reported for epidemiological studies has been nearly identical to those reported for clinical samples. The reported prevalence rate for the coexistence of ADD and CD ranges between 30% and 50% in these studies, whereas the coexistence of ADD with ODD either alone or in combination with CD has been estimated to be at least 35% (Biederman, et al., 1991).

According to Biederman, Newcorn, & Sprich (1991), the bulk of the evidence suggests that ADD and CD are at least partially independent disorders, although some researchers have argued for the interdependence of the conditions (e.g., Shapiro & Garfinkel, 1986). Halperin, O'Brien, Newcorn & Healey (1990) suggested that hyperactivity is related less to environmental factors than aggression is and that aggression may be associated with low SES and other environmental conditions.

Support exists for a specific type of ADD/H with conduct disorder (August, Steward, & Holmes, 1983; Forness et al., 1992; Walker, Lahey, Hynd, & Frame, 1987). These children have been

described as more physically aggressive and displaying a greater variety and severity of antisocial behavior (Walker, et al., 1987), and they are less successful academically with specific problems in reading comprehension and mathematics (Frick et al., 1991; Forness et al., 1992). Also, they are more inclined toward substance abuse as adolescents (Barkley, 1990). These children are referred at a younger age than children with ADD/H only (Walker et al., 1987) and may constitute a group with a particularly serious form of conduct disorder or ADD. Although similar behavioral patterns have been observed for children with ADD and ODD, they seem to form an intermediate subgroup with regard to severity between those who have ADD alone and those with ADD plus CD (Biederman, et al., 1991).

Research in ADD and Emotional Disorders

Prevalence rates for mood disorder and anxiety disorder in conjunction with ADD range from 15% to 75% for mood disorder and 20% to 30% for anxiety disorder (Barkley, 1990; Pliszka, 1989). The coexistence of these types of affective disorders with ADD places children at considerable risk for later, more serious psychiatric disturbance.

In a familial risk analysis of ADD and major depressive disorder by Biederman, Faraone, Klenan, Knee, & Tsuang, (1989), the results were the following. First, the risk for major depressive disorder among the relatives of children in the experimental group was significantly higher than the risk among relatives of normal comparison children. Second, the risk for

major depressive disorder was the same among relatives of experimental group children with and without major depressive disorder and significantly higher in both groups than among relatives of normal control children. Finally, the two disorders were not distinguishable within families. The authors concluded that ADD and major depressive disorder may represent different expressions of the same etiologic factors responsible for the manifestation of ADD.

Youngsters with ADD and mood and anxiety disorders are a relatively understudied group from an educational perspective. Pliszka (1989), in his study of the coexistence of anxiety disorder and ADD, found these children to be less impulsive and more sluggish than those without anxiety disorder. His results suggest that children with ADD and anxiety may have primary anxiety and develop secondary inattentiveness, or they may represent a different subtype of ADD, perhaps similar to the condition of ADD without hyperactivity under DSM-III.

Ability and Achievement

A common finding reported in the general literature on ADD is that children with ADD score below normal comparison children on standardized measures of ability and achievement (Barkley, 1990). Although the lower performance of children with ADD on standardized tests could be attributed to inattention, impulsive responding, and hyperactivity as debilitating factors, we also noted that relatively few studies directly assessed the potential effects of low SES and co-existing conditions on performance in

the selection of research samples. Accordingly, to better evaluate the findings on ability and achievement, we randomly selected two-thirds (n=36) of the 57 studies we reviewed for the present section of the report and summarized the data reported on IQ and achievement measures. Of the 36 studies, 32 (88%) reported information on IQ; 27 studies (75%) reported information on achievement; and four (11%) did not report data on either IQ or achievement.

General Intelligence

Although 32 studies reported IQ, the data were difficult to summarize in any meaningful way. Seven studies (22%) used measures of vocabulary as abbreviated IQ tests (e.g., the vocabulary subtest of the WISC-R or Peabody Picture Vocabulary Test), and 13 studies (41%) restricted the range of IQ to above 80 or 85; two studies used a full-scale WISC-R IQ of 69 to rule out children with mental retardation. Although the restricted samples would be expected to show average IQs in the normal range (i.e., 85-115), nine studies without restricted samples also reported IQs well within the normal range.

Although four studies (Barkley, DuPaul, et al., 1990; Borcherding et al., 1988; Dykman & Ackerman, 1991; and Ackerman et al., 1986) found the control group to have significantly higher IQ scores than the ADD group, the average IQ for ADD children was still within the normal range, and the difference would not be regarded as educationally significant (e.g., 6 to 12 points) for males in Dykman & Ackerman (1991). Moreover, Dykman

and Ackerman (1991) found that the average IQs of "pure ADD" children were comparable to those of normal comparisons when children with combined ADD and reading disability were removed from the total sample of ADD children. Also, the studies that used a full-scale WISC-R cut-off of 85 or above for inclusion were less likely to report statistically significant differences in IQ.

Accordingly, we found little evidence to suggest that children with ADD are impaired intellectually and agree with other authors who suggest that lower than average IQs in ADD research samples may be due to the failure to control SES (Carbon et al., 1987; Dykman & Ackerman, 1991) or to the co-occurrence of LD or CD in heterogeneous samples of children with ADD (Borcherding et al., 1988; Ackerman et al., 1990; August & Stewart, 1982; Dykman & Ackerman, 1991).

Academic Achievement

Although over half of the total number of studies we reviewed for this synthesis reported IQ scores, we found that there was a paucity of studies on ADD that specifically address the association between academic achievement and ADD and that, when this was addressed, the evidence was equivocal. Of the 36 studies we sampled for this section, only 11 (30%) collected data on achievement, and only four found an association between academic underachievement and ADD. Frick and colleagues (1991) found academic underachievement to be related to ADD combined with CD. However, when they controlled for CD, only ADD children

without CD were found to score lower than control children. On the other hand, when Dykman and Ackerman (1991) subdivided their ADD sample into groups with and without hyperactivity (ADD and ADDH) and further subdivided each subtype into groups with and without reading disability (RD), only those children with RD were found to underachieve relative to other ADD children with or without hyperactivity. Also, children who were ADD with hyperactivity and aggression underachieved only when they also had RD.

Hynd and colleagues (1991) found underachievement to be associated primarily with the ADDnoH group. The most salient difference between the ADDH and ADDnoH group in this study was in mathematical achievement, with the ADDnoH group performing significantly more poorly on math achievement measures. However, the sample size in this study was very small. In contrast, Barkley, DuPaul, and McMurray (1990) found the control group and the ADDnoH group in their study performed significantly better than the ADDH group and a group of children with LD on the math subtest of the WRAT. On the reading and spelling subtests, the control group outperformed all of the other groups, which suggested an association between underachievement and ADD with and without hyperactivity apart from co-occurring LD. In sum, given this pattern of equivocal findings, additional research is needed before any firm conclusions can be drawn regarding the relationship between academic underachievement and ADD with and without hyperactivity and with co-occurring disorders.

Long-term Effects of ADD

Follow-up studies of children with ADD have indicated that they are significantly more at risk for negative outcomes than normal comparison children (Barkley, 1990). Cantwell (1985) found that ADD symptoms continue into adolescence for 50-80% of the population. Common outcomes include poor academic performance, self-image, and peer relationships. Antisocial behavior was evident in approximately 25% of the cases. This study suggested that hyperactivity, which may persist into adulthood, may increase the risk for later antisocial behavior, substance abuse, and conduct disorder found in adolescents.

A four-year follow-up study of hyperactive boys with and without CD indicated the following: (a) inattention and impulsivity remained relatively stable in both subgroups, while overactivity diminished for hyperactive boys, (b) hyperactivity in childhood did not necessarily lead to major behavior problems in adolescence, and (c) early aggressive undersocialized conduct disorder was associated with antisocial and delinquent behavior in adolescence (August, et al., 1983; Satterfield, Hoppe, & Schell, 1982). In a prospective study of 103 males (aged 16-23 years), who were diagnosed as ADD-H between the ages of 6 and 12 years, and 100 normal controls, Mannuzza, Gittelman, and Konig (1989) found that the presence of antisocial and conduct disorder almost completely accounted for criminal activities in former hyperactive children whether or not it was accompanied by substance abuse. This study supported the view that childhood

ADD-H is a risk factor for later criminality, but that this relationship is almost exclusively mediated by the development of an antisocial disorder in early adulthood.

The greatest risk factor for development of antisocial behavior and drug abuse seems to be maintenance of ADD/H symptoms (Gittelman, Mannuzza, Shenker, & Bonagura, 1985). Additionally, behavior problems for adolescents with ADD who use drugs are greater for those who were hyperactive as young children (Mannuzza, Gittelman, Bonagura, Konig, & Shenker, 1988). The association of childhood ADD with antisocial behaviors of adults, however, may be an artifact of the overlap between ADD and CD (Lilienfeld & Waldman, 1990).

In an 8-year prospective study, Barkley, Fisher, Edelbrock, & Smallish (1991) and Barkley, DuPaul, et al. (1990) found that although behavior problems tend to decline over time, their persistence as well as conflicts between mothers and children are significantly greater in hyperactive than in normal children. These youngsters are three times more likely to have failed a grade and tend to fall further behind academically, particularly in mathematics achievement, than their peers. Adolescents with ADD tend to be more withdrawn and less communicative than younger children with ADD (Nussbaum et al., 1990).

The additive factors of conduct problems and familial stress seem to exacerbate the negative behaviors of older children with ADD (Barkley, 1990). A prospective study of 166 hyperactive, 74 "behavior problem" controls, and 127 normal controls at ages 17

and 18 years of age suggested that familial, social, and cognitive factors substantially contributed to explaining educational outcomes, substance abuse, and conduct disorder. In sum, given these long-term outcomes associated with ADD, the importance of early detection and intervention is evident for children with ADD.

Summary

The three questions posed at the beginning of this section of the synthesis provide the framework for the conclusions that are drawn from the research on subtypes and coexisting disorders.

1. Do individuals with ADD comprise a homogeneous, unitary group?
   * Individuals with ADD constitute a heterogeneous group showing wide variation on multiple symptoms and characteristics.
   * There is considerable empirical evidence and agreement among researchers to support at least two subtypes within a broad category of ADD: ADD/H and ADD/WO. These subtypes have distinguishable symptoms that are believed to exist along a continuum of severity.
   * ADD frequently coexists with other learning, behavioral, and affective disorders including learning disabilities, conduct disorder, oppositional defiant disorder, mood disorders, and anxiety disorders.
   * The limited research on gender differences among children with ADD suggests minimal differences between

boys and girls. However, girls with ADD seem to be characterized more by cognitive deficits in contrast to boys whose salient characteristic is behavioral disturbance.

* Manifestations of ADD vary across the developmental stages, with high rates of behavioral problems and cognitive impairment in adolescence. The association of childhood ADD with antisocial behaviors of adults may be an artifact of the overlap between ADD and CD.

2. What are the educational, behavioral, cognitive, and social-emotional characteristics of ADD?

* Educational characteristics of children with ADD include disproportionate rates of academic failure and retention. Academic underachievement, characteristic of youngsters with LD and often associated with CD, is also characteristic of many children with ADD.
* Behavioral characteristics include classroom behavioral problems, aggressivity and other conduct problems, and high rates of suspension and expulsion from school. The overlap of ADD and CD and ODD seems to exacerbate the disturbing behaviors displayed by children with ADD.
* Cognitive characteristics include both selective and sustained attentional problems, impulsivity, and disinhibition. Cognitive tempo differences between ADD/H and ADD/WO children have been documented.

* Social-emotional characteristics include unpopularity, peer rejection, and poor peer relationships. Mother-child conflicts frequently are evident among individuals with ADD.

3. What are the long-term effects of ADD?

* Children with ADD are at greater risk than other children for negative behavioral, social, and emotional outcomes.
* Children with ADD who are also conduct disordered or who live in dysfunctional families are at even greater risk for negative outcomes.

Implications for Educational Classification of Children with ADD

* Children with ADD who manifest behavioral problems in the form of oppositional behaviors or hyperactivity are referred earlier than children who do not display such behavior.
* Children with ADD without hyperactivity are generally older than ADD/H children when identified, implying that these children may be overlooked for referral by teachers and parents. Because ADD/WO is often associated with poor academic performance, particularly in mathematics, children who have ADD/WO may not be referred until they begin failing in school.
* Girls with ADD appear to be overlooked for referral and are generally underidentified, suggesting a need to establish criteria specific for ADD in girls for early

and accurate identification.

* ADD/WO may overlap more with LD than ADD/H. Because academic underachievement is associated with both ADD/WO and LD, children with ADD/WO who are referred to special education may meet criteria for placement in learning disabilities programs.
* ADD/H may overlap more with CD or ODD. Because disturbing and disturbed behaviors are often associated with ADD/H and CD or ODD, children with ADD/H who are referred to special education may meet criteria for placement in behavioral disorders programs.
* If children with ADD do not display academic problems or serious behavioral problems, they most likely will receive instruction in regular classrooms. However, because of concomitant problems associated with ADD, these youngsters may be at risk for grade retention or other long-term effects of ADD.

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ASSESSMENT AND IDENTIFICATION OF ADD IN PRESCHOOL CHILDREN

The purpose of this section is to synthesize the research literature relevant to the assessment and identification of ADD in preschool-aged children. Table 4 in Appendix B presents a representative list of research studies relevant to assessment and identification of young children who may have ADD.

The importance of this literature is hard to overemphasize: early identification can lead to early intervention which then can lead to improved outcomes. In general, the literature on early intervention shows that children at-risk for school failure who receive quality early education programs are less likely to be placed in special education, retained in grade, to show delinquent behavior and/or get in trouble with the law (Lazar & Darlington, 1982). Literature involving young children with disabilities shows that early intervention appears to be effective for maintaining or accelerating their rate of development (Simeonsson, Cooper & Scheiner, 1982). These outcomes may be compared with a recently published follow-up study by Barkley et al. (1990) that showed that hyperactive adolescents were three times more likely to have failed a grade or been suspended and more than eight times more likely to have been expelled or have dropped out of school than comparison youth.

However, there are a number of well-recognized difficulties with early identification, including:

- the highly individualized progression of young children through various developmental stages, so that it is difficult to

discriminate between "normal" and "abnormal" behavior or between transient and persistent problems (Campbell, 1985; Shaywitz & Shaywitz, 1988);

- the fact that labeling or diagnosing a young child may lead to negative and/or restrictive expectations, undue strain on both child and family, and perhaps (in severe cases) removal of the child from a mainstream environment (Fallen & Umansky, 1985); and

- the fact that accurate measurement of problems and associated difficulty in differentiating one type of problem (e.g., hyperactivity) from another (e.g., conduct disorders, learning disabilities) is clearly more difficult when preschool-aged children are involved (Campbell, 1985).

Much of the literature on Attention Deficit Disorder involves school-aged children; there is relatively little literature on preschool-aged children with ADD, possibly because of the difficulties mentioned above. Problems with the literature that are relevant to the early identification of ADD, in addition to the relative paucity of studies, include: the use of different criteria used to select "problem" children across studies; the use of different instruments and/or assessment procedures across studies; the existence of relatively few prospective, longitudinal studies so that accurate data can be collected over a number of years; fairly high attrition rates in some prospective, longitudinal studies that do exist; the confounding of hyperactivity with aggression/conduct disorders; and the

existence of very few studies in which children are clearly identified as having ADD (or some form of ADD).

In spite of these problems, the literature relevant to early assessment and identification of ADD does show converging lines of evidence, so that it is possible to draw conclusions from it. It should be noted that the literature in this synthesis is primarily limited to that based on children between the ages of three and six years of age because of the requirement of persisting problems (i.e., at least six months to one year) to identify ADD. The following subsections present first the conclusions and supporting literature with regard to identification and second the conclusions and supporting literature with regard to assessment of preschool-aged children who may have ADD.

Identification of ADD in Preschool Children

The research literature shows that it is possible to identify certain problem behaviors, e.g. hyperactivity, in preschool-aged children. It should be noted that most of the relevant literature does not focus on young children with reliably identified/diagnosed ADD (exceptions will be noted below). Rather, it focuses primarily on young children who show signs of hyperactivity (a core symptom of ADD) and aggression (Campbell, 1985). It is not known whether this focus is a function of the disorder, e.g. hyperactivity is the first symptom to appear from a developmental perspective, or a function of the greater difficulty in measuring the relatively invisible

constructs of inattention and impulsivity.

The descriptions of the behaviors displayed by "problem" children in the literature clearly indicate that the core behavior of hyperactivity can be identified during the preschool years. Further, young children who have problems with hyperactive behavior can be differentiated from their peers without such problems in a variety of areas.

Preschool-aged children who are hyperactive are likely to differ from those who have no such problems during free play. For instance, a prospective longitudinal study by Campbell and her colleagues (Campbell, Szumowski, Ewing, Gluck & Breaux, 1982; Campbell & Breaux, 1983; Campbell, Breaux, Ewing & Szumowski, 1984; Campbell, 1987; Campbell & Ewing, 1990) focused on children whose parents complained about overactivity, difficulty playing alone, short attention span, tantrums and defiance during the preschool years and on comparison children selected from the community. Initial observational data gathered in a laboratory setting showed that the parent-referred problem children (who were around the age of three) changed activities more often during free play, engaged in more very short activities (20 seconds or less), engaged in fewer long activities (lasting 2 minutes or more), and played more with nontoy objects than control children. A later study by Campbell and her associates (Campbell, Pierce, March, Ewing & Szumowski, in press) with a different sample of children (all males) determined that boys in the problem group (who met the DSM-III criteria for ADDH as

measured by the SNAP) were more active, inattentive, noncompliant and irritable in different settings, i.e. their home and preschool as well as the laboratory setting. During free play, the problem boys were less focused, more disorganized, and received higher ratings for active/aggressive play.

Hyperactive children can be differentiated from non-hyperactive children through use of structured tasks (mostly assessed in laboratory settings) in addition to parent ratings and observations. During structured tasks, the parent-referred problem children were more active and fidgety, were more often out of seat and off-task, and were more impulsive in a task where they had to delay reaching for a cookie (Campbell et al., 1982). Further, they were more often out of seat, showed poor impulse control, and were more careless (Campbell et al., in press).

A number of studies show that hyperactive and/or aggressive preschool-aged children differ from comparison children in their peer relationships; these findings are similar to studies of peer relationships at later ages. In an epidemiological study of young children, Buss, Block, & Block (1980) found that highly active children (as measured by an actometer) seemed to take advantage of other children (e.g., they were more manipulative), assert themselves more (e.g., they were more competitive), and were less obedient and/or compliant than less active children. Campbell (1987) found that children with persistent problems of hyperactivity and aggression rated higher on measures of

antisocial and aggressive behavior across all ages than children without such problems or whose problems had improved. She also found that maternal ratings of peer rejection differentiated problem versus control children and that rejection did not improve with age.

Rubin and Clark (1983) found that children rated Hyperactive/ Distractible on the Preschool Behavior Questionnaire received few positive and neutral peer ratings of popularity and a great number of negative peer ratings; further, high ratings on the Hyperactive/ Distractible factor were associated with aggressive problem-solving strategies such as bribery ("If you don't give me the ball, I'll . . ."). The major difference between children rated Hyperactive/ Distractible from those rated Hostile/Aggressive was that hyperactive (but not hostile/aggressive) children had nonadaptive play styles.

However, there appears to be some indication that aggressive behavior accounts for much of the peer rejection of young hyperactive children and that aggressive behaviors displayed by hyperactive children are perhaps qualitatively different from the behavior displayed by children whose primary problem is aggression. Milich, Landau, Kilby & Whitten (1982) found that while hyperactive/aggressive children were rejected by their peers, only aggression was uniquely associated with rejection. Children rated as purely hyperactive by both their preschool peers and teachers were either rejected or highly popular with their peers, perhaps because they were highly visible in a

nonstructured setting like the preschool classroom. Campbell et al. (in press) found that problem boys (who were diagnosed as ADDH as measured by the SNAP) were more likely to engage in "high intensity", less socially competent play which became aggressive at times. However, the problem boys engaged in prosocial behavior and were involved with, and showed interest in, their peers. These data indicate that aggressive behavior in hyperactive children may be related to problems of impulse control rather than to opposition and defiance.

The research literature consistently shows that the mother-child relationship is likely to be impaired and that observations of mother-child interaction differentiate preschool-aged hyperactive from non-hyperactive children. Mash and Johnston (1982) found that in unstructured play and structured task situations, hyperactive children asked more questions than non-hyperactive children and as a rule were more negative and noncompliant. Further, younger (around 5 to 6 years) hyperactive children showed rates of negative and noncompliant behavior about twice that of older (around 8 1/2 years) hyperactive children. The mothers of the hyperactive children were more directive, e.g. they issued more commands, were more negative and less approving, and did not interact with their children as much as mothers of non-hyperactive children.

Similarly, Campbell, Breaux, Ewing, Szumowski & Pierce (1986) found that mothers of problem children made more negative control (e.g., disapproving, discouraging) statements and tried

to redirect their children's activity more than mothers of non-problem children. Again, children in the problem group were more aggressive and physically active than non-problem children. Campbell et al. (in press) found that young boys diagnosed as ADDH were more irritable and noncompliant with their mothers than control children. Cohen and Minde (1983) determined that mothers of children who were hyperactive across settings (pervasively hyperactive children) gave more negative feedback to their children than mothers of children who were hyperactive only in specific situations or than mothers of non-hyperactive children.

Unfortunately, these poor interaction patterns appear to continue. In a follow-up study of young children followed into adolescence, Barkley, Fischer, Edelbrock & Smallish (1991) found that mothers and hyperactive children continued to display more negative/controlling behavior and less positive/facilitating behavior respectively toward each other, continuing mother-child interaction patterns observed eight years earlier.

Again, there is some evidence that impairment in mother-child relationships may not be related to the presence of ADD. In a study involving children identified as hyperactive on the basis of stringent research criteria, and who likely would meet the criteria for ADHD in DSM-III-R, Barkley et al. (1991) concluded (on the basis of analyses of subgroups at the eight-year follow-up) that the presence of oppositional defiant disorder, not the presence of ADD, accounted for differences between hyperactive and control children with regard to mother-child interaction,

home conflicts and maternal stress.

Not surprisingly, measures of maternal/parental stress differentiate mothers of hyperactive and non-hyperactive children. It may be that age of the children influences stress: one study found that most of the differences in maternal stress were reported by mothers of younger (between 5 and 6 years of age) hyperactive children, possibly because the childrens' degree of bother and distractibility emerged as a major source of stress (Mash and Johnston, 1983). Further, in this study parents of hyperactive children reported lower levels of parenting self-esteem, saw themselves as less competent than parents of normal children with respect to their skills in being a good parent and knowledge of parenting, and derived less value and comfort from their role as parents. Mothers' feelings about themselves as a parent were related to their husbands' perceptions of their hyperactive child as problematic; however, the reverse was not true.

There is considerable literature indicating that family factors, e.g. marital problems, existence of a relative with problems, maternal depression, and general family adversity, are associated with problem behaviors in young children, particularly with persistent problems. For example, Richman et al. (1982) found that maternal reports of behavior problems in three-year-old children were related to reports of family problems. Similar results were found by McGee et al. (1984), who related poor family relationships and less family stability to persistent

behavior problems. Campbell and Ewing (1990) also found that children whose behavior problems had been identified at age three came from families experiencing more stress than control families.

Campbell, March, Pierce, Ewing & Szumowski (1991) found that problem boys, regardless of the source of their identification, were more likely than control boys to come from families experiencing more change and instability. Earls and Jung (1987) found that while temperament was the more powerful predictor of behavior problems, the persistence of problems in boys (not girls) was associated with stressful home environments.

Finally, it appears that problem/hyperactive children may be differentiated on the basis of measures of temperament. Prior and Leonard (1983) found that hyperactive and nonhyperactive children differed in terms of their "manageability," a factor which included the temperamental variables of distractibility, mood, adaptability, and rhythmicity. The hyperactive children received more negative scores on these variables. Similarly, Earls and Jung (1987) found that low adaptability and high intensity, measured at age two, predicted high behavior problem scores at age three in a general population sample of children.

Other studies involving preschool-aged children also examine the relationship between earlier behaviors and behavior at three years. Weissbluth (1984) found a "general relationship" between the sleep duration and temperament of three-year-old children and the characteristics they displayed when they were

four to eight months old. Similarly, Earls & Jung (1987) found that while no home environment characteristics predicted problem behavior at age three, the temperament characteristics of high activity, low adaptability, high intensity and negative mood at age two were significantly related to behavior problems at age three.

A second conclusion based on converging lines of evidence is that hyperactivity and associated characteristics (e.g., impulsivity, inattention) can be identified in children as early as three to four years of age, and some researchers state that this is the optimal period for identification. In some studies, either selection criteria or retrospective maternal reports involve onset of hyperactivity and related symptoms between the ages of three and four. In Barkley, Fischer, Edelbrock & Smallish (1989), parents of hyperactive children reported an average age of onset for symptoms of ADDH around 3.7 years. (Selection criteria used in this study included the development of problem behaviors prior to age six). Similarly, selection criteria used by Mash and Johnston (1982) included a developmental history of hyperactivity, with onset occurring around two to three years of age.

However, the evidence for identification of problem behaviors at three to four years of age rests primarily on prospective, longitudinal studies of either a single group of children or multiple (problem and control) groups. Palfrey, Levine, Walker & Sullivan (1985) studied 174 children from mixed

backgrounds who were participating in an intensive educational and diagnostic early education program; data were collected between birth and second grade. The behaviors of interest in the literature referenced here included chronic inattention, distractibility, disorganization, poor self-monitoring, impulsivity and overactivity. Children between the ages of 30 to 42 months produced the greatest number of concerns regarding these behaviors, leading the authors to conclude that this period is critical for detecting symptoms of problem behaviors and considering prompt intervention.

Similarly, Buss et al. (1980) studied children participating in a university-based study of ego development. The children were three years old at the time of initial testing; subsequent data collection occurred at four, five, and seven years of age. Measures of activity taken on the children during preschool years through use of an actometer were found to correlate "substantially" with independent judge-based measures of activity even at age seven. The researchers concluded that when reliability is improved by the use of multiple measures, "appreciable coherence" of personality which remains discernable over considerable lengths of time can be detected as early as three years of age.

Fischer, Rolf, Hasazi & Cummings (1984) followed 541 children who had participated in a preschool epidemiological survey until they were 9-15 years of age. The analyses in this study involved the relationship between externalizing and

internalizing behaviors. Much more stability was found for externalizing behaviors than for internalizing behaviors, and severe externalizing behavior problems were found primarily in children aged three to four years, leading the authors to conclude that this period might be a critical time of onset and that later appearance of externalizing behaviors might mean they are more transient. Another study of children who were subjects in a prospective, longitudinal study of 267 families from lower socioeconomic backgrounds (Jacobvitz & Stroufe, 1987) assessed the children at six months, two years, three and a half years, and six years of age. It was found that measures of distractibility at 42 months predicted clinical diagnosis of ADD with hyperactivity at age five or six.

Campbell et al. (1982), studying 68 2- and 3-year old children referred by their parents, found that parent ratings of activity and laboratory measures of sustained attention and impulsivity correctly classified 88% of the "problem" children, thus discriminating between most "problem" and control group children. This outcome led the researchers to conclude that hyperactivity can be identified in very young children. At follow-up for this same group of children when they were age nine (Campbell & Ewing, 1990), the researchers found that young children who had had significant problems at age three, especially those whose problems had remained clinically significant at age six, were more likely than comparison children to have serious problem behaviors. Indeed, 78% of the variance in

maternal reports of hyperactivity, impulsivity and inattention when the children were age nine was predicted by a difficult infant temperament (retrospectively determined), free play behavior during preschool years, observed negative and non-compliant child behavior with the mother during the preschool years, hyperactivity ratings at age three, and diagnosis of ADDH (using the SNAP) at age six. Even after the effects of infant temperament and child behavior were removed from the analysis, maternal ratings of hyperactivity when the children were three years of age predicted 12% of the variance in maternal reports of hyperactivity, impulsivity, and inattention at age nine.

In spite of the evidence that it is possible to identify problem behaviors in young children aged three to four, it is extremely important to note evidence showing that discontinuity of behavior from the preschool years to later years is the rule. Based on the literature, it is quite clear that most children who exhibit problem behaviors during the preschool period will not exhibit problem behaviors later on.

Palfrey et al. (1985) reported that while 41% of the children attending an early intervention educational and diagnostic program met the criteria for possible concerns regarding problem behaviors during the first five years of life, only 13% met the criteria for "definite" concerns and only 5% met the criteria for definite and persistent concerns. Fischer et al. (1984) followed 541 children participating in the Vermont epidemiological study for a number of years, studying the

continuity of their behavioral adjustment from preschool through elementary and junior high school. The very moderate correlations between early and later behavior which they obtained led them to conclude that discontinuity rather than continuity in behavioral adjustment from preschool to later ages is the rule.

Studies which use relatively stringent criteria for selecting children with behavior problems also show that problem behaviors may not last. As noted earlier, Campbell and her colleagues studied a group of children rated by their parents at age three as having problems with hyperactivity, inattention, and impulsiveness; the parent ratings were confirmed by laboratory measures. When they entered school at age six, exactly half of the children identified as having behavior problems at age three had improved so that they no longer had significant problems with overactivity, concentration, restlessness, and/or disobedience (Campbell et al., 1986). Even when a sample of children is carefully selected on the basis of stringent research criteria, as is the case for the 123 hyperactive children in Barkley et al. (1991), not all continue to have problems: 18% of these children did not meet the DSM-III criteria for diagnosis as ADHD at follow-up eight years following the initial assessment -- although 72% did.

Given the literature showing that problems indicative of ADD identified in preschool-age children do not necessarily result in poor outcomes and/or identification of ADD, one must ask the question whether it is possible to distinguish between young

children who are likely to have persistent and serious problems and those whose problems are not so severe and likely are transient. The research appears to indicate that it may be possible to identify during the preschool years those young children whose hyperactivity, impulsivity, and inattention indicate ADD for two reasons: ADDH appears to be stable over time, and there appear to be differences in the nature and severity of initial problems presented by children who are later diagnosed as having ADD with hyperactivity as opposed to those whose problems improve.

One set of studies examined the stability of different types of problem behaviors and/or DSM-III diagnoses over time. Beitchman, Wekerly & Hood (1987) assessed diagnostic continuity from preschool to middle childhood in a group of 98 children who had attended a therapeutic preschool program. Initial diagnoses were based on DSM-III criteria and fell into five groups: conduct-type disorders (oppositional disorder, conduct disorder), attention deficit disorders (ADD with and without hyperactivity), emotional disorders (overanxious disorder, avoidant disorder), developmental delay disorders (borderline intellectual functioning, mild and moderate mental retardation), and no diagnosis. At follow-up, three to eight years after the initial diagnoses, children with developmental delay or ADD were the most likely to receive the same diagnosis. Specifically, 48% of the children with an initial diagnosis of ADD received a diagnosis of ADD at follow-up; exactly the same proportion of children with an

initial diagnosis of developmental delay received a diagnosis of developmental delay at follow-up. Within the ADD group, diagnostic stability was particularly evident for ADD children with hyperactivity.

Similarly, Cantwell and Baker (1989) followed 151 children who at initial assessment received DSM-III diagnoses based on data collected from multiple sources. Thirty-five of the 151 children received a diagnosis of ADD with hyperactivity, and five received a diagnosis of ADD without hyperactivity at initial data collection. (The age of the children at time of original diagnosis ranged between 2.3 to 15.9 years). At the time of follow-up, approximately four years later, only three diagnoses showed high stability: infantile autism, attention deficit disorder with hyperactivity, and oppositional disorder. Specifically, 28 of the original 35 children with ADDH had the same disorder; of these 28, 23 had "pure" ADDH and five had ADDH plus an additional diagnosis. Only three of the original 35 children were considered free of problems at follow-up. Interestingly, an initial diagnosis of ADD without hyperactivity was the least stable diagnosis over time: none of the children originally diagnosed as having ADD without hyperactivity maintained the same diagnosis.

A second set of studies focused on the characteristics that distinguish children who have persistent or pervasive problems involving hyperactivity and related characteristics from those who have transient or situational problems. Campbell (1987)

reported on developmental changes in symptoms of parent-referred problem three-year-olds when the children entered school at age six. As noted earlier in this section, half of the original problem group had improved, while half had not. Children whose problems had persisted over the three-year period had been rated as having more initial problems and as having problems of greater intensity than the improved children. Further, the initial problems reported by the mothers showed less developmental change over the three-year period. Family stress and disruption and poorer mother-child relationships were also related to the persistence of problems.

A final report when this same group of children had reached the age of nine (Campbell and Ewing, 1990) parallels the data at age six. Early child behavior, especially symptoms of hyperactivity and aggression, specific maternal control strategies (e.g., negative and "power-assertive" strategies), and continuing family stress predicted symptoms of ADDH and conduct problems at age nine and predicted maternal reports of problems at age nine. Additionally, behavior at age six powerfully predicted behavior at age nine: 67% of the problem children who showed clinically significant problems at age six met DSM-III criteria for an externalizing disorder by the age of nine.

Campbell et al. (in press) report on another group of children identified as ADDH when they were between 2 1/2 and 4 1/2 years of age. Persistent problems continuing when these children (all boys) reached the age of six appeared related to a

combination of more severe difficulties (i.e., problems across settings and relationships) and a family environment characterized by stress.

Cohen and Minde (1983) compared children with pervasive and situational symptoms of hyperactivity. They found that children with pervasive problems received higher scores on the Conners' Behavior Rating Scale, that mothers of pervasive problem children gave more negative feedback, and that pervasive children shifted activities more frequently, were more disruptive and aggressive, and played alone for the largest proportions of preschool class time. However, only one psychological test, involving motor impulsivity, differentiated the pervasively hyperactive children from the situationally hyperactive children.

Assessment of ADD in Preschool Children

As a rule, the literature relevant to identification of ADD, or of problem behaviors central to ADD, indicates that parents in particular can help identify children who indeed have problems with hyperactivity, impulsivity and inattention.

Campbell et al. (1982) conducted a multidimensional assessment of three-year-old children identified by their parents as having problems with activity, inattention, aggression who were also difficult to discipline. Laboratory measures (e.g., observations of children's performance on structured tasks) confirmed that the parent-identified toddlers in fact were more active, inattentive and impulsive than comparison children. At the one-year follow-up, the parent-referred problem children

continued to be more active, impulsive and inattentive, and laboratory measures continued to confirm parent reports of problems (Campbell et al., 1984).

By the age of six, those parent-referred children who met DSM-III criteria for ADD had been rated at the age of three by their mothers as more inattentive, impulsive and overactive during the preschool years and as worse than other problem children on measures reflecting discipline problems, poor peer relations, aggression, and somatic complaints (Campbell et al, 1986). Initial maternal ratings on three symptoms (concentration difficulties, disobedience, and "restless/squirmy" predicted outcomes at age six for three out of four children (Campbell, 1987). Despite the fact that different (and age-appropriate) measures were used to obtain maternal perceptions of child behavior over time, Campbell and Ewing (1990) found that maternal reports of symptoms of ADDH were consistent across time, from age three to age nine.

In later work with another sample of children, Campbell et al. (1991) selected children with problem behaviors who were referred by their mothers and another group who were referred by their teachers. The rationale was that there can exist a relationship between children's behavior problems and family stress; therefore, parent referral of a child for behavior problems can be related to elevated ratings of hyperactivity, inattention, and/or impulsivity given by overwhelmed mothers. In short, ratings showing problem behaviors in children could be the

product of maternal stress rather than the existence of such behaviors in the children, but this potential problem could be checked by comparing parent-referred children with teacher-referred children. Since both teachers and mothers referred children who exhibited more hyperactivity, inattention, and/or impulsivity than control children, the researchers found no evidence that the behavior of parent-referred children reflects any selection bias.

Teacher and spouse ratings also tend to support maternal ratings of problem behaviors in young children. Children who met DSM-III criteria for ADD at age six were not only rated as more inattentive, impulsive and overactive by their mothers, but also by their teachers. (The teacher ratings were corroborated by independent ratings of classroom behavior on the part of the problem children). When the same group of children reached the age of nine, again teacher ratings were consistent with maternal reports of problems. It should be noted that these were not the same teachers who had rated the children at the age of six, when maternal reports were also confirmed by teacher reports (Campbell and Ewing, 1990). Additionally, Mash and Johnston (1983) showed high correlations between maternal reports of stress and both mothers' and fathers' perceptions of their child as having problem behaviors.

The literature overwhelmingly supports the concept of multidimensional assessment of young preschool children. The term "multidimensional" implies a number of assessment

strategies, e.g. behavior ratings supplemented by observations, made by different individuals, e.g., mothers, teachers, peers, and trained observers, in as many settings as possible, e.g., the playground, the classroom, and the home.

Campbell et al. (1982) determined that a combination of parent reports and laboratory measures (observations of structured tasks; observations of mother-child interaction) best discriminated parent-referred problem children from control children; further, the laboratory measures contributed significantly and independently to the discrimination, leading the authors to argue for multidimensional and cross-situational assessment. Cohen and Minde (1983) found that direct observations of mother-child interaction of of children in their preschool classrooms provided the clearest differentiation between groups of children, supporting direct observation as a useful diagnostic tool.

Glutting and McDermott (1988) found that behavior rating scales were practical and necessary measures for assessing ADHD because the data reflected children's behavior in a variety of natural environments. Buss et al. (1980) concluded that actometer measures of preschool activity correlated substantially with independent judge-based measures of activity at follow-up. Milich et al. (1982) found that peer nominations of popularity, even at preschool ages, fulfill psychometric criteria of inter-rater and retest (one week) reliability and that peer ratings of rejection correlated with teacher and peer ratings of

hyperactivity and aggression.

Other researchers advocate for the use of observational data. Rubin and Clark (1983), while stating that ratings on the Preschool Behavior Questionnaire are mirrored by observational evidence to a moderate degree, noted it would be desirable to supplement use of the PBQ with other observational measures. Earls and Jung (1987) noted that observational measures offer a way around the problem of rater (particularly parent) bias. Mayes (1987), citing data showing that hyperactive children were identified with 97.5% accuracy using an analysis based on observation scores, argued that rating scales must be combined with more objective determination of attention deficit disorder with hyperactivity.

Finally, Palfrey et al. (1985) stated that identification of clusters of problems signal a more "malignant" form of attention deficit. This conclusion is supported by Mash and Johnston (1983) who argued in favor of multidimensional assessments including measures of a wide range of child and family problems -- particularly since family variables may be associated for some children with more persistent problems of hyperactivity, inattention, impulsivity, and aggression.

In addition to the literature in which researchers conclude on the basis of the evidence in a single study that multidimensional assessment is necessary to accurately identify ADD or symptoms central to ADD, there is literature in which data from a specific source both discriminates and fails to

discriminate between problem and control children. For example, Buss et al. (1980), as noted above, found that actometer measures taken during the preschool period correlated with later measures of activity. However, Campbell et al., 1982 and 1984, could not differentiate between problem and control children on basis of actometer readings -- although other measures (observations, ratings) did discriminate the two groups.

Similarly, Prior and Leonard (1983) found that preschool teachers' ratings on the Preschool Behavior Questionnaire only marginally discriminated between groups regarding overall disturbance and did not discriminate on any of the three factors assessed by this instrument. They interpreted this finding as a function of the preschool setting, where teachers may not regard hyperactive behavior as a problem, or of situationally-specific hyperactivity. (Interestingly, Milich et al., 1982, also concluded that identifying a distinct dimension of hyperactivity in preschool settings was hampered by the unstructured nature of the preschool setting and the limited demand for sustained attention and/or controlled motor activity.) However, Campbell et al., 1986 and 1990, found that teacher ratings were consistent with maternal reports and in fact did discriminate between problem and control groups. (However, these were elementary school, rather than preschool, teachers.)

Conclusions

Briefly, this synthesis of the research literature on early assessment and identification has shown the following:

* It is possible to identify serious problem behaviors central to Attention Deficit Disorder in preschool-aged children, with the period between three to four years perhaps the optimal time for early assessment.

* Children with ADD with hyperactivity are the most likely to be identified as having serious problem behaviors during the preschool period, primarily because hyperactivity is "visible." Children with ADD without hyperactivity most likely would not be identified during this period.

* Although most children have behavior problems that are transient, children with serious and persistent problems (who are most in need of early intervention) will be characterized by extreme scores on various measures showing severe problems (e.g., they will be the most disruptive and aggressive children), pervasive problems across settings (e.g., home, preschool, playground), more problems in general (e.g., they will have problems with temperament, relationships, behavior, coping with external stress - and later they will have problems regarding achievement), and there will be less developmental change in these problems as they mature.

* In order to assess the severity, pervasiveness, and extent of the behavior problems exhibited by children who may have ADD (probably with hyperactivity) and to therefore both accurately assess and be in a better position to intervene with these problems, professionals should employ multiple measures, use multiple sources, and examine behavior in multiple settings.

* A comprehensive assessment of a child suspected of having ADD and/or serious behavioral problems might include measures of mother/child interaction and perhaps maternal stress to foster a family-centered approach to intervention. Given the literature on family disruption/dysfunction and maternal stress associated with pervasive and continuing problems in young children, it appears that a family-centered approach to intervention will be the most effective approach in ameliorating existing problems and preventing the development of additional problems as the child matures.

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FAMILY CHARACTERISTICS

There is a considerable literature with regard to the characteristics of the families of children with ADD or who display the symptoms central to ADD, e.g., hyperactivity. This literature is very important with regard to the assessment and identification of children with ADD for a number of reasons. First, it provides some insight into factors that appear related to both the persistence and pervasiveness of ADD or its core behaviors. Second, it encourages a systems approach to assessment and identification in that the child is viewed as part of a larger system that includes the family and, ultimately, the community. Such a systems approach in assessment and identification will help lead to a family-centered approach to intervention, which may be important for many children with ADD, especially young children. Finally, this literature informs us about familial risk for ADD and related problems.

The literature on family characteristics suffers from the same limitations as much other literature on ADD. Specifically, there are major differences in the samples of children and youth in this literature due to different selection criteria. Some of the literature focuses on hyperactive children (who may or may not have ADD), while other specifically identifies children/youth with various manifestations of ADD, e.g., ADD only, ADD plus "delinquency", ADDH, and ADDH with CD. Most samples of children/youth with ADD or the core features of ADD (e.g., hyperactivity) in this literature are clinic identified, but

there are some samples that are school identified or community identified for epidemiological purposes. Additionally, the subjects in these studies may be selected on the basis of more scientific/research-oriented criteria (e.g., 2 SD above on the mean on a specific scale) or other criteria (e.g., availability of data). Finally, different measures are used in different studies to assess both child characteristics and outcomes.

Mother-Child Interaction

A very consistent finding in the literature on ADD is that mother-child interactions are considerably impaired when the child is hyperactive or has ADD with hyperactivity. (See Table 6 in Appendix B for a representative sample of this literature). In comparison to mothers of non-hyperactive children, mothers of hyperactive/ADDH children tend to score higher on measures of maternal interference, maternal control, and overstimulating caregiving (Barkley, Fischer, Edelbrock & Smallish, 1991; Jacobvitz & Stroufe, 1987; Mash & Johnston, 1982; Webster-Stratton & Eyberg, 1982). They are also more directive, more negative and less positive toward their children (Tarver-Behring, Barkley & Karlsson, 1985; Barkley, Karlsson & Pollard, 1985; Mash & Johnston, 1982; Webster-Stratton & Eyberg, 1982). Additionally, they initiate fewer interactions with their children and are less responsive to child-initiated interactions (Barkley et al., 1985; Mash & Johnston, 1982).

In comparison to non-hyperactive children, hyperactive boys are less compliant with regard to maternal direction (Tarver-

Behring et al., 1985; Befera & Barkley, 1985; Tallmadge & Barkley, 1983; Mash & Johnson, 1982), more non-accepting (Webster-Stratton & Eyberg, 1982), and more negative toward their mothers (Barkley et al., 1985; Befera & Barkley, 1985; Mash & Johnston, 1982).

However, the literature indicates that mother-child interactions may differ in relation to child characteristics (i.e., age), the pervasiveness of the problem behaviors displayed by the child, and the demands of the setting in which the interaction takes place. As noted in the preceding section, the problems discussed above with regard to mother-child interaction appear particularly acute with younger children and their mothers. Mash and Johnston (1982) found that younger hyperactive children were more than twice as negative and noncompliant and were less responsive to their mothers than older hyperactive children and normal control children. Similarly, Barkley, Karlsson and Pollard (1985) found that older boys with ADDH and their older normal controls were more compliant, while their mothers gave fewer commands and tried to control less than younger mother-child dyads. It also appears that while mother-child interaction improves as the children grow older, children with ADDH or hyperactivity continue to lag behind their normal peers with regard to compliance and responsiveness (Barkley et al., 1985).

In studying situationally and pervasively hyperactive subgroups of children, Cohen and Minde (1983) found that children

with situationally specific symptoms had qualitatively different interactions with their mothers than pervasively hyperactive children. Specifically, mothers of situationally hyperactive children were more disapproving of their children than mothers of pervasively hyperactive or control children, leading the authors to conclude that a negative child management style might be related in part to the problems displayed by situationally hyperactive children.

There also appear to be some differences in mother-child interactions in different settings, i.e. free play and structured task situations. Barkley, Karlsson and Pollard (1985) found differences in the behaviors of older and younger boys with ADDH toward their mothers only during structured task settings, not during free play. Tallmadge & Barkley (1983) found that differences in interaction between hyperactive child/parent dyads and normal child/parent dyads were more noticeable in structured task settings. Similarly, Mash & Johnston (1982) found that between-group differences in mother-child interactions were greatest not only when a younger hyperactive child was involved, but were especially notable in structured task situations. In effect, mother-child interaction becomes even more stressful when the hyperactive/ADDH child must meet or cope with increased demands in the environment.

In sum, there is very little doubt that there is a strong relationship between maternal control strategies and the behaviors and persistence of behaviors of children with

hyperactivity and/or ADDH (Strayhorn & Weidman, 1988). Mash and Johnston (1990), in reviewing the literature on parenting stress in families of hyperactive children and physically abused children, stated that difficult child characteristics are a probable source of interactive stress for families of hyperactive children. This contrasts with their conclusions about families of abused children, where parental characteristics and adverse environments - but not child characteristics - are the major source of interactive stress.

The importance of mother-child interaction lies in its stability over time and in its relationship with later child outcomes. Longitudinal research shows clearly that difficult mother-child interactions during the the early years of a child's life have significant stability and predict continuing child behavioral problems and mother-child conflict into later youth and adolescence (Campbell & Ewing, 1990; Barkley et al., 1991). These findings argue strongly for a family-centered approach to assessment and intervention and for early intervention to improve both child conduct/responsiveness and maternal control strategies/ responsiveness.

Maternal Stress

Given the literature on difficult mother-child interaction when the child has ADD with hyperactive or displays hyperactive behaviors, it should not be surprising that the literature on ADD also addresses the issue of maternal stress. (See Table 6 in Appendix B for a representative sample of this literature). A

consistent finding is that mothers of children who are hyperactive or who have ADDH report more personal psychological stress/distress, less parenting self-esteem, and more feelings of self-blame/depression/isolation than mothers of normal children (Barkley et al., 1991; Brown & Pacini, 1989; Cunningham, Bennett & Siegel, 1988; Webster-Stratton & Hammond, 1988; Mash & Johnston, 1983).

The severity of this stress appears to be related to a number of factors, particularly the age of the child, the nature of the situation, and the existence of external sources of stress or supports. (Clearly, these findings reinforce the literature presented in the previous section showing more impaired mother-child interactions when the children are young and/or when the interaction takes place in a more structured setting). In one study, mothers of younger hyperactive children reported higher levels of stress associated with child characteristics (Mash & Johnston, 1983a). In two others, maternal reports of stress were related to hyperactive child-sibling interaction particularly during supervised task situations as opposed to free play (Mash Johnston, 1983c), and were significant predictors of their behavior only for structured task situations, not free play situations (Mash & Johnston, 1983b).

Mothers who had fewer community contacts were more aversive in their behaviors towards "problem" children than mothers who had more community contacts (Dumas & Wahler, 1985). Similarly, mothers were more aversive toward their "problem" children on

days in which they themselves experienced aversive interactions with other adults than on days in which they had no such unfortunate experiences (Dumas, 1986). Mothers and fathers of ADDH children have reported fewer visits with extended family members, and mothers of ADDH children have found these extended family contacts to be less helpful than parents of normal children (Cunningham et al., 1988). Cunningham, Bennett & Siegel (1988) also found that maternal depression scores were linked to both child behavior problems and family dysfunction, but paternal depression scores were linked only to family dysfunction.

Family Stress/Dysfunction

A number of studies have found general family stress related to parental complaints about hyperactivity, short attention span, and aggressive/defiant behavior in children and youth (Campbell, Pierce, March, Ewing & Szumowski, in press; Campbell & Ewing, 1990; Barkley, DuPaul & McMurray, 1990; Barkley, Fischer, Edelbrock & Smallish, 1990; Hamden-Allen, Stewart & Beeghly, 1989; McGee, Williams & Silva, 1984; August & Stewart, 1983; Cohen & Minde, 1983). (See Table 8 in Appendix B for a sample of this literature). There are indications that the relationship between family stress and child problem behaviors may be considerably stronger if the child is ADDH (Campbell et al., in press; Campbell & Ewing, 1990; Brown & Pacini, 1989; Prinz, Myers, Holden, Tarnowski & Roberts, 1983) or simply hyperactive (Barkley et al., 1990; McGee et al., 1984; Cohen & Minde, 1983). (It should be noted that "family stress and dysfunction" is

defined in several ways: being on welfare, unexcused paternal absences from work, quitting/changing jobs, moving frequently, failing to repay debts, squandering family income, marital discord, broken homes/parental separation, poor family relationships, drug/alcohol abuse, and parental coldness toward/criticism of the child).

Other literature indicates that the link between family stress/dysfunction and ADD/ADDH is found usually or only when children present evidence of conduct disorder, "delinquency", and aggressiveness. In one epidemiological study, Moffitt (1990) found that boys who had ADD only had normal family scores, while those who had ADD and were also "delinquent" had scores strongly indicating family adversity. In another epidemiological study, Szatmari et al. (Szatmari, Boyle & Offord, 1989) found that neither being on welfare nor family dysfunction contributed to a diagnosis of ADDH when conduct disorder is removed as a possible confounding variable.

Some longitudinal studies have found general family stress related to the persistence of problem behaviors (Campbell et al., in press; Marshall, Longwell, Goldstein & Swanson, 1990; Campbell & Ewing, 1990). This may be particularly true for boys: for males, while temperament appears important in predicting later behavior problems, stressful home environments are important in determining the severity and persistence of problems (Earls & Jung, 1987). Family stress may be related also to the pervasiveness of problems: Hamdan-Allen, Stewart & Beeghly (1989)

found that boys with pervasive (as opposed to situational) conduct disorder came from families in which mothers abused drugs more often and fathers had more frequent antisocial behavior than boys with situational conduct disorder or control boys.

However, other studies of interest may raise questions about the link between family adversity and problem behaviors. Some studies done with clinical populations are at odds with other studies. For instance, Cohen & Minde (1983) found that family stress and dysfunction (i.e., broken homes, marital discord, and parent psychiatric illness) did differentiate hyperactive children from control children, but did not differentiate pervasively and situationally hyperactive children. Clearly this contradicts the findings of Hamdan-Allan, Stewart & Beeghly (1989) cited above. Prinz, Myers, Holden, Tarnowski and Roberts (1983) found no relationship between marital problems and aggression/conduct problems in hyperactive boys, which may contradict findings showing a relationship between aggressiveness/conduct disorder and family stress/dysfunction also cited above. Similarly, Marshall, Longwell, Goldstein & Swanson (1990) found no relationship between parental behavior and conduct disorder/oppositional-defiant disorder behaviors in children.

Other contradictory literature comes from nonclinical samples. One of the few studies in which the sample was selected from elementary schools (as opposed to clinic referrals) found a weak association between marital discord and child behavior

problems (Emery & O'Leary, 1984). Another study (Goodman & Stevenson, 1989) in which the sample consisted of 13-year-old twin pairs from the community found that family factors explained less than 10% of the variance in measures of hyperactivity; this was in contrast to genetic factors, which accounted for approximately half off the explainable variance in measures of hyperactivity.

In sum, the literature appears to show that family stress and dysfunction may be correlated with problem behaviors, and may be related to the persistence and pervasiveness of these behaviors. Additionally, the relationship between family stress/dysfunction and problem behaviors may be stronger when children display aggressive/conduct disorder behaviors in addition to problems such as inattention and poor impulse control. The correlation appears strongest for clinic-referred populations rather than for community-based populations.

Familial Risk

The literature regarding risk for problems in the families of children with ADD is remarkably consistent in its findings and conclusions. (See Table 9 in Appendix B). This literature shows that children who have ADD or ADDH come from families that have higher than usual rates of ADD and other DSM disorders (Biederman, Faraone, Keenan, Steingard & Tsuang, 1991; Faraone, Biederman, Keenan & Tsuang, 1991; Barkley et al., 1990; Goodman & Stevenson, 1989; Alberts-Corush, Firestone & Goodman, 1986; Biederman, Munir, Knee, Habelow, Armentano, Autor, Hoge &

Waternaux, 1986; Stewart, deBlois & Cummings, 1980).

Goodman & Stevenson (1989) found that genetic effects accounted for half the explainable variance in measures of hyperactivity in their large, representative community sample of 13-year-old twins. Biederman, Munir, Knee, Habelow, Armentano, Autor, Hoge & Waternaux (1986) found that the rate of ADD was significantly higher in relatives of children with ADD (31.5%) than in relatives of children without ADD (5.7%). They also found that relatives of children with ADD also had higher rates of oppositional disorder, major depressive disorder, and conduct disorder than relatives of non-ADD children. Further, male relatives of ADD children were more affected than female relatives; however, more female relatives of ADD children were affected than female relatives of non-ADD children. It should be noted that these findings hold true for girls with ADD as well as for boys: Faraone, Biederman, Keenan & Tsuang (1991) found that relatives of girls with ADD had higher risk for ADD, antisocial disorders, major depression, and anxiety disorders, and that this higher risk could not be accounted for by gender, generation of the relative, age of the ADD child, social class, or family intactness.

The nature of familial risk may be somewhat different for subgroups of children with ADD. Barkley, DuPaul & McMurray (1990) found that families of children who had ADD without hyperactivity had more anxiety problems and learning disorders than families of ADDH children. On the other hand, families of children who had

ADD with hyperactivity had not only more ADD, but also more aggression and substance abuse than families of children who had ADD without hyperactivity. Somewhat similar relationships were found by Biederman et al. (1991) in that risk for anxiety disorder was twice as high in relatives of children who had ADD (as defined in DSM-III) plus anxiety disorder than in relatives of children who had ADD only, and was higher in relatives of all ADD children than in relatives of normal control children. August and Stewart (1983) studied 95 boys considered hyperactive; they found that if the hyperactive children had at least one parent with antisocial behavior, the children were also deviant on dimensions of conduct disturbance and had siblings with a high prevalence of conduct disorder. On the other hand, hyperactive children whose parents displayed no antisocial behavior showed little evidence of conduct disturbance, had more learning and academic problems, and had siblings with learning and attentional problems, but not conduct disorder.

Summary

In general, the literature on the family characteristics of children with ADD (with or without hyperactivity) supports the interaction between various family factors and child problem behaviors. Families whose members have ADD and related problems appear to be at risk for having children with some form of ADD. As these children grow and develop, there appears to be an interaction between family dysfunction and/or stress and problem behaviors exhibited by the children -- although the exact nature

of this interaction appears to be mediated by specific child characteristics and parental factors. It is clear that difficulties are especially acute in the area of mother-child interaction, which in turn may be related to the pervasiveness and persistence of problem behaviors and to the severity of maternal stress.

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ETHNICITY AND SES ISSUES IN THE ASSESSMENT AND IDENTIFICATION OF CHILDREN WITH ADD

The purpose of this section is to synthesize the literature relevant to ethnicity/multicultural issues and socioeconomic status (SES) in the assessment and identification of children with Attention Deficit Disorder (ADD). Table 10 in Appendix B present a representative sample of the literature in these areas.

For the past 25 years, educators in particular have been sensitive to, and concerned about, the over-representation of minority children in special education in terms of the prevalence of these children in the general school population. The Fourteenth Annual Report to the Congress on the Implementation of the Individuals with Disabilities Education Act reports that disabled youth are twice as likely to be African-American, substantially less likely to be Hispanic, and only slightly less likely to be white than the total school population (U. S. Department of Education, 1992, p. 15). Of note, however, is the high disproportion of Hispanic youths in the Other Health Impaired (OHI) category of exceptionality and the disproportion of African-American youth in the Serious Emotional Disturbance (SED) category, among others. (These data have been highlighted here because children with ADD can receive special education and related services if needed in the OHI category and because of the co-occurrence of ADD with SED).

The reasons for the disproportion of minority children in special education is not clear. Since low socioeconomic status

(SES) appears related to incidence of disabilities, and since the National Longitudinal Transition Study found that 57% of African-American youth and 49% of Hispanic youth live in households with annual incomes less than $12,000 (Wagner, 1989), there is clearly the possibility of a relationship between SES and disproportionate prevalence of minorities in special education, particularly for African-American children. It makes sense that low SES is related to poor prenatal and early childhood nutritional/health care which in turn results in some disability. Other possible explanations include racial bias in assessment instruments or in expectations which teachers hold for certain children.

Given this background, the literature synthesized in this document is relevant to the potential for over-identification of minority children as having Attention Deficit Disorder (ADD) in the United States. This focus means that studies of children with ADD done in other countries have been omitted unless they shed light on the issue at hand. Additionally, there is some literature involving translations of various instruments into other languages and/or the existence of minority or ethnically diverse children in populations of students on which instruments have been normed. This literature is also excluded from this section because it is not central to the focus of this section. What is synthesized in this section is literature relevant to the socioeconomic status of children who may have ADD and of course literature discussing the racial/ethnic composition of children

already identified as having ADD.

It should be emphasized that there is very little literature in this area. Since much of the literature on ADD comes from clinically- rather than educationally-oriented journals, the racial and socioeconomic status of the children/youth who are the subjects of the study are noted only occasionally; SES appears to be mentioned somewhat more often than ethnicity or racial composition. Very, very rarely is ethnicity or race part of the data analysis.

Literature on Socioeconomic Status

Barkley, Fisher, Edelbrock, & Smallish (1990), in discussing the relationship between ADHD and socioeconomic status, stated that there is an inverse relationship between SES and ADHD, i.e. the lower the SES, the more severe the symptoms of ADHD. This is corroborated by the work of Holborow, Berry, & Elkins (1984) who assessed the prevalence of hyperactivity among 1900 children in seven schools. More hyperactive children were found in the lower SES schools; this finding held true across the three different rating scales used to identify hyperactivity in the children. Similarly, Offord, Boyle, Racine (1989), who studied 2,660 children in the Ontario Child Health Study, found that the variables having a significant relationship with a diagnosis of hyperactivity were (in order of strength of relationship) low income, family dysfunction and chronic illness (tied), sex (male), and age (12-16). Schachar, Rutter and Smith (1981), who studied 1,536 children on the Isle of Weight, found that, when

they used the father's occupation to determine social class, children from "lower" social classes were more likely to be rated as hyperactive than those from "higher" social classes. Trites (1979) found higher rates of hyperactivity in poor sections of Ottawa. Lambert, Sandoval, & Sassone (1978) studied 5200 children for the purposes of assessing prevalence rates of hyperactivity. These researchers also found that the prevalence rates for hyperactivity in lower SES children were somewhat "higher than expected"; however, they noted that hyperactive children were identified at all SES levels of the population.

However, not all the literature clearly supports the relationship between SES and hyperactivity or ADHD. Edelbrock and Achenbach (1980), who studied 2,683 children on the east coast of the United States to identify behavior problem patterns, found no significant differences regarding SES among children with different profiles of behavior problems. Achenbach and Edelbrock (1981), in another study of 1300 children referred for outpatient mental health services, found significant effects for SES in 13 out of 1,666 regression analyses of their data and in 53 out of 119 analyses of covariance. Although their data showed a tendency for lower SES children to have higher problem behavior scores and lower competency scores than children from higher SES background, they found that only minimal proportions of the variance in reported behavior problems were accounted for by SES.

Shekim et al. (1985) studied 114 nine-year-old children in the rural midwest and found no differences in SES between the

children identified as ADHD and those with either other DSM-III diagnoses or no diagnosis at all. McGee and Silva (1984), in a New Zealand study of 489 boys, found that boys having behavior problems involving aggression and/or hyperactivity came from "disadvantaged" home backgrounds. However, these researchers concluded that the disadvantage was not so much a matter of low SES as it was a matter of family disorganization. Specifically, the researchers concluded that low maternal mental ability, poor maternal psychological health, parental separation or single parent families, and poor family relationships interacted in varying degrees with cognitive impairments and behavioral problems in the boys. It appeared that the boys' problems impaired or limited their ability to cope with the stresses in their environment. This fits with the work of Hechtman, Weiss, Perlman & Amsel (1984), who found that adult outcome of hyperactives was not associated with any one variable, but with the additive interaction of personality characteristics, social, and family factors.

To the extent that there is a relationship between SES and family disorganization, there is some evidence that hyperactive/ ADHD children tend to come from dysfunctional families or families experiencing unusual stress. Barkley et al. (1990) determined that the hyperactive children had moved four times more in an eight-year period and twice as much during their lifetime as nonhyperactive children, fathers of hyperactive children had changed jobs more than twice as often as fathers of

control children, and three times as many mothers of hyperactive children had separated from or divorced the children's biological fathers. Additionally, fathers of the "purely" hyperactive children were more likely to display antisocial behavior (although the rates of antisocial behavior were highest for fathers of children with both hyperactivity and conduct disorder).

Finally, Szatmari, Offord, & Boyle (1989), determined that being on welfare discriminated between ADDH and non-ADDH children; however, when other disorders (e.g., conduct disorder) were controlled in their analyses, being on welfare no longer contributed to a diagnosis of ADHD. Interestingly, Szatmari et al. (1989) found that being on welfare was associated with ADDH to a greater extent for girls than for boys. Urban living, however, continued to discriminate between ADDH and non-ADDH children in all analyses.

The findings of Szatmari et al. (1989) are reinforced by Halperin et al. (1990). In a sample of 85 non-referred school children, these authors found that 17.6% were diagnosed as aggressive and 22.4% were diagnosed as hyperactive/aggressive -- rates much higher than rates found in other non-referred school samples. Halperin and his colleagues concluded that the difference might be due to the lower SES of the sample in that SES factors play an important role in the development of aggressive behaviors, but not in the development of hyperactivity per se.

Literature on Race/Ethnicity

Edelbrock and Achenbach (1980) examined 2680 children in an effort to identify the distribution and correlates of disturbed child behavior patterns. They found that the demographic variables of SES and race had small effects which were inconsistent across age and sex of the participating children. When racial effects were found, Black males were over-represented in children determined to be hyperactive and under-represented in children determined to have schizophrenia. Black females were under-represented with regard to hyperactivity and over-represented with regard to delinquency. The racial differences were found only for children aged six to eleven, not for older children.

Lambert et al. (1978) studied 5200 children in the San Francisco area to determine prevalence rates of hyperactivity. The proportion of Black children defined as hyperactive only by school personnel (as opposed to parents or physicians) was "considerably" higher than that of other ethnic groups between the third and fifth grades. The researchers stated that one explanation for this finding might be the interaction between the behavior of Black children and the classroom environment.

Eaves (1975) asked 33 sets of teachers (one Black and one White teacher) to rate the behavior (using the Behavior Problem Checklist) of 458 fourth- and fifth-grade boys in regular education classrooms in two rural Georgia school systems. He found that White teachers consistently and statistically

significantly rated the behavior of Black and White children differently. Specifically, they rated Black children as more deviant and White children as less deviant. The Black teachers had no such difference in their ratings of these childrens' behavior. Based on these data, Eaves (1975) concluded that either White teachers are more susceptible to racial stereotyping than their Black counterparts or that the behavior occurring in the classroom reflects an interaction between a White teacher and a Black child.

Conclusion

As stated above, there is very little literature in this area. However, the literature that exists appears to indicate that:

* Children from lower SES homes may be over-represented in populations of children identified as ADD, especially if the children display both hyperactivity and aggression;

* Children from racially/culturally different backgrounds are likely to be over-represented in populations of children identified as ADD - particularly as ADD with hyperactivity - for a variety of possible reasons.

* Perhaps the best that can be done to insure that practices and procedures are not biased toward minority children is to follow the assessment/identification practices in IDEA, i.e. to identify use instruments that are unbiased to the greatest possible extent (e.g., culturally different children have been included in the norms) and to gather data from multiple sources

through multiple methods. Additionally, in school settings it would be appropriate for a team of professionals, as opposed to a single individual, to make decisions with regard to both the existence of ADD or some form of ADD and about placement.

Finally, it should be noted that the literature obtained to date primarily involves African-American children. Consequently, it does not contribute to any understanding of the over-representation of Hispanics in the OHI category of exceptionality. Given the literature suggesting a relationship between low SES and higher levels of aggressive behavior, it may help explain the over-representation of African-American children, who often come from poorer families, in the SED category.

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GENERAL CONCLUSIONS: EDUCATIONAL CHARACTERISTICS AND ASSESSMENT

The purpose of this final chapter of our synthesis is to briefly outline what we know about the educational characteristics of children with ADD in an informal format, i.e. without references to the research. Readers who care to know about the sources of this information are referred to the appropriate chapter in the synthesis proper. However, we thought it might be helpful to those educators who want a succinct summary of this topic to include this section, which is based on Dr. McKinney's remarks to the audience at the National Forum ON ADD held in Washington, DC in January 1993.

This chapter first identifies a number of limitations of the literature which serve to qualify the conclusions that can be drawn concerning the educational characteristics of children with ADD. The next sections summarize the major findings concerning the typical educational variables that are of interest from an assessment perspective along with a discussion about some of our concerns about sociodemographic and multicultural issues in the literature base on ADD, and in the field of education more generally. Finally, we discuss the findings with respect to their implications for educational assessment.

Limitations of the Knowledge Base

The generality and interpretation of the research on educational characteristics of children with ADD is quite limited by a number of factors. First, since most of the research was conducted and reported from a mental health perspective and used

clinical rather than school-based samples, there is less evidence available than one might expect, given that our literature base contained over a thousand articles. Second, ADD has been defined and measured in different ways, which generates at least three types of research samples: children who are hyperactive or hyperactive/aggressive, those with and without hyperactivity, and those with the three dimensions of inattention, impulsivity and hyperactivity. Third, some studies failed to account for co-occuring learning disabilities, behavior problems, and various levels of socioeconomic status. Finally, girls were consistently undersampled or not studied at all in the bulk of available studies.

This limits the research base in the following ways. First, information on educational characteristics is rarely reported, which narrows the literature base to around 90 articles. Second, when this literature is narrowed further on the basis of type of educational characteristic and type of sample, there is very little replication. With these caveats, the following are our summary findings.

Educational Characteristics and Placement

General Intelligence.

A common finding across studies that compare children with ADD to those in normal comparison groups is that children with ADD score below normal comparison students on individually administered IQ tests. However, the average performance in the majority of studies is still well within the average range

between 85 and 115. Although the symptoms of ADD may impair the performance of children on cognitive tasks that require sustained attention and effort, the literature also suggests that the lower IQ scores reported in some studies are due to the failure of researchers to distinguish between children who have ADD only and those who have ADD and learning disabilities. Those studies that have subtyped samples of children with ADD and co-occurring conditions generally indicated that ADD children with learning disabilities have lower IQs that those who have ADD only. Also, few differences in IQ have been reported between ADD children with and without hyperactivity in the absence of learning disabilities. In sum, we find no evidence to suggest that children with ADD are impaired intellectually apart from other co-occurring conditions, and lower SES in some samples.

Achievement in Academic Subjects.

A number (but surprisingly few) studies in the literature report the academic achievement of children in the research samples. Also, scant information is available on the number and relative severity of achievement problems across different academic subjects. This problem could be due to the absence of this data on clinical samples, or it may be that achievement data is not routinely reported since the bulk of the research we reviewed is not targeted to educational audiences.

In any event, the prevalence of children with ADD who have underachievement in reading relative to age norms varied from 9% to 24%; this compared with 2% to 8% of normal comparison

samples. Although relatively few studies reported math difficulties, we found two studies in which more children with ADD were underachieving in math compared to reading. Also, it may be that the underlying cognitive deficits associated with reading disabilities are gender-related; however, this issue has not been studied sufficiently due to the underrepresentation of girls in ADD research samples.

Underachievement in mathematics characterized ADD/WO children compared to ADD/H children, although one study found no differences in clinic samples of ADD/H and ADD/WO children with respect to ability and achievement discrepancies. Difficulty in mathematics experienced by ADD children may be partly attributable to their failure to automatize number facts, a characteristic that seems to be related to attentional problems.

Inattention is an overriding characteristic of children with ADD generally. However, differences between subtype groups have been noted. It may be that ADD/WO children tend to have more cognitive and attentional problems than ADD/H children, who, in turn, demonstrate more conduct problems. Also, girls with ADD appear to have a shorter attention span and less concentration, and they may be characterized more by their cognitive deficits than behavioral disturbances.

It should be noted that many of the studies reporting achievement for children with ADD did not take IQ, gender, and SES into account. Additionally, many studies did not account for co-occuring learning disabilities. Consequently, we are unable

to systematically determine the relationship between academic achievement and other vairables such as ADD alone, ADD in combination with LD, and different levels of SES and IQ present in samples of children with ADD.

Functional Outcomes.

Follow-up studies of adolescents indicate that, on average, children identified as hyperactive between the ages of four to sixteen were at least three times more likely to be retained in grade and suspended from school than children in normal comparison samples. The numbers of children who were expelled from school and/or who drop out were generally twice those of normal children. Most of this type of evidence comes from follow-up studies of children identified clinically as hyperactive during childhood and may not reflect the outcomes for children who only have attentional problems. Again, many of these follow-up studies did not consider the effects of co-existing conditions such as LD and conduct problems, which would also predict poor outcomes apart from or combined with ADD.

Special Education Placement.

The prevalence of children with ADD who receive special education has not been studied extensively or directly. Most of the research on ADD and co-occurring conditions that might qualify children for special education under existing categories has been conducted on clinical samples in which the co-occurring conditions are identified based on limited measures and/or on DSM criteria rather than educational criteria for comperhensive

assessment. Further, the research question in these studies pertained to the number of children with ADD who would meet diagnostic criteria for LD or CD, not the number of children who were identified for special education who would meet the criteria for ADD. We found no studies that compared the educational characteristics of children with ADD who were placed in special education compared to children with and without other types of disabilities.

However, there were several studies of service utilization for children with ADD which indicated that about one-third of children diagnosed as hyperactive received special education services, and another third of those with hyperactivity and co-occurring conditions also received special education. For instance, one study reported that 32% of hyperactive children in a clinical follow-up sample were placed in programs for learning disabled children, 36% were served in programs for children with serious emotional disturbance, and 16% received speech therapy. Other studies have shown that placement is related to ADD subtype: for instance, one study reported that 53% of ADD children without hyperactivity were placed in LD programs compared to 34% of ADD children with hyperactivity.

Social Relationships and Skills

A very consistent finding in the literature was that the majority of children with ADD have significant problems in social relationships. Repeatedly, studies of peer nominations and other methods report that hyperactive children were disliked more, less

popular, and rejected more often than normal peers and classmates. These findings are consistent across multiple sources (parents, teachers, peers) and multiple methods (rating scales, observations).

However, several factors complicate any generalization to ALL children with ADD. Some evidence is available to suggest that hyperactive/aggressive boys have more negative teacher and peer interactions than boys who are hyperactive only, although both groups were found to be less popular and accepted. However, the peer status of hyperactive children who are not aggressive may improve with age.

Other studies of ADD subtypes suggest that while ADD children with hyperactivity were more aggressive and unpopular, ADD children without hyperactivity were more withdrawn, but not more rejected. This description of the social characteristics of children who have ADD without hyperactivity is similar in many ways to the characteristics of LD children, who also have problems with respect to popularity but not outright rejection.

In sum, children with ADD do display significant problems in social relationships with other children and adults. However, these problems may be more or less severe and qualitatively different for ADD children without hyperactivity, with hyperactivity alone, or with hyperactivity and aggression. The separate contributions of inattention, impulsivity, hyperactivity, aggression, and cognitive variables to the social problems of ADD children have not been well elaborated.

ADD and Learning Disabilities

The co-occurrence of ADD with learning disability is well documented in the literature. However, the degree of co-occurrence in the research literature varies greatly with the sample of children. When children with LD constitute the research sample, the percent classified as ADD varied from 20% to 63% across studies. When children with ADD constitute the research sample, the percent classified as LD varied from 10% to 80%.

This variability across studies can be attributed to differences in the definitions of ADD and LD used in the study, sampling procedures, stringency of selection criteria, and instruments. Two studies have been conducted that used well-defined ADD samples and multiple cut-off scores for defining LD based on IQ/achievement discrepancy. When "liberal" criteria were used to define LD in samples of children with ADD, the two studies produced co-occurrence rates of 38% and 40%. When less liberal criteria were used, the co-occurrence rates were 23% and 27%. When stringent criteria were used, the two studies identified co-occurrence rates of 10% and 19%. We should note that the incidence of a co-existing condition in a sample of children who all display a primary condition (either ADD or LD) does not reflect the actual overlap of the two conditions because the cases were neither sampled nor classified independently.

Epidemiological studies that examine ADD and LD are rare and differ from each other methodologically. However, those that have sampled cases and classified ADD and LD independently report

lower estimates of co-occurrence ranging from 9% to 11%.

It should be emphasized that the majority of children with ADD are not likely to have LD. Neuropsychological evidence, while not always consistent, suggests that children with ADD do not necessarily have the memory, perceptual, or linguistic problems that characterize many children with learning disabilities. The essential problem for children with ADD appears to be one of behavioral regulation and sustained effort that interferes with task completion, not cognitive and/or linguistic disability. However, the available evidence suggests that 10% to 25% of children with ADD are likely to meet current IQ-achievement discrepancy criteria for classification of LD and that most of these children will be inattentive and distractible, but not necessarily hyperactive.

ADD and Behavior Disorders

Up to 62% of clinic-referred samples of children with ADD display significant problems related to aggression, oppositional/defiant behavior and conduct problems. However, in many studies high rates of co-occurrence between ADD and disruptive behavior disorders can be attributed to diagnostic criteria and instruments that confound hyperactivity and aggression in the selection of samples, quite apart from a referral bias toward more severe cases. When ADD is defined more carefully in terms of inattention, impulsivity and hyperactivity, the overlap with conduct disorder was found to vary from about 20% to 45%, depending upon age. Both cross-sectional and prospective follow-

up studies indicate that the frequency of co-occurrence between ADD and conduct problems increases with age.

The literature on the co-occurrence of ADD with internalizing disorders such as anxiety and depression has been inconsistent, with some studies showing co-occurrence rates of 27% to 32% and others studies failing to find a significant incidence of co-occurring emotional disorders. The literature also shows that emotional disorders may vary as a function of age and gender. A large scale epidemiological survey in Ontario, Canada, found that the co-occurrence of emotional disorders and ADD was 20% in boys and 17% in girls between the ages of four to eleven, but was 24% for boys and 50% for girls between the ages of twelve to sixteen.

In sum, there is a very clear and consistent link between ADD with hyperactivity and externalizing disorders, primarily oppositional/defiant and conduct disorders. This link is most evident in children who have symptoms of hyperactivity, impulsivity and aggressive behavior that arise early in childhood and persist throughout the elementary school years. However, the relationship between ADD without hyperactivity and emotional and behavioral disorders is not entirely clear.

Speech and Language Problems

Children who are hyperactive and impulsive children tend to talk more than normal children. A number of studies suggest that children with ADD are less proficient and more dysfluent in their speech and have more problems with articulation than normal

children. The prevalence and significance of speech problems among children with ADD is difficult to estimate because of the high rates and instability of these problems in normal children. Comparative studies of children with ADD and normal children suggest that from 10% to 54% of children with ADD have expressive, but not receptive, language problems compared to 2% to 25% of normal children. The percentage of all children with disabilities who receive special education for speech and language problems is about 25%. We have found no evidence to suggest that children with ADD have receptive language problems that cannot be attributed to learning disabilities.

Additionally, studies of service utilization suggest that from 9% to 16% of ADD children with hyperactivity have received speech and language therapy at some time from preschool to the elementary grades. On the other hand, one study of clinic referred children found that 34% of ADD children with hyperactivity received speech and language therapy compared to 43% of ADD children without hyperactivity, compared to 72% for ADD children with LD and 11% in a community control sample.

In sum, the evidence on the prevalence of speech and language is inconsistent across studies, but suggests nevertheless that when problems are evident, they are more likely to involve expressive rather than receptive language. The problems in expressive language are manifested primarily by dysfluent speech. While there is little evidence for developmental language delays for children who have ADD only,

they may be evident in the history of ADD children who also have LD.

Sociodemographic Characteristics

The bulk of the research literature that we reviewed consists primarily of comparative studies of children with ADD, normal control groups, other groups of interest (such as students with different subtypes of ADD and/or other conditions). Although data on SES, race and ethnicity may be reported, it is done inconsistently. Even when it is reported, it is rarely analyzed. As a result, we know little about variation in the educational characteristics of children with ADD that might be attributed to sociodemographic factors such as mothers' or fathers' educational or socioeconomic status, race, ethnicity, or neighborhood environment.

The best evidence on sociodemographic factors come from epidemiological studies with large population samples. In general, these studies have focused on the prevalence of ADD and its symptoms narrowly or on child health and service utilization broadly. Although these studies differ in focus and method, we found that the majority supported the conclusion that hyperactive children are disproportionately found at lower SES levels and/or found disproportionately to attend "disadvantaged" or lower SES schools. Also, the Ontario Child Health Study found higher prevalence rates of hyperactivity in urban as opposed to rural areas of Canada.

On the other hand, at least two studies have found no

association between ADD and SES, and others have attributed SES effects to factors such as family disorganization and dysfunctionality associated with poverty, economic distress and other family stress and parental health problems. Also, most of the perinatal and environmental risk factors associated with ADD are those associated with other conditions which have higher prevalence rates among children reared in poverty and unfavorable home/neighborhood environments.

With respect to assessment and identification, the over-identification of lower SES children as ADD in some studies can be attributed to the use of instruments that tend to identify children who are hyperactive and have conduct disorder. Studies which separated children with conduct problems from samples of ADD children with and without hyperactivity have reported more representative samples with respect to SES.

Multicultural Characteristics

There has been considerable concern among educators, parents, and policy-makers about the over-representation of minority children in special education compared to their proportional representation in the general population. The latest Annual Report to Congress on implementation of IDEA indicates that African-American students are twice as likely to be identified as disabled compared to their proportional representation in the general population. Hispanic students are substantially less likely to be identified in most special education categories except "Other Health Impaired", in which

their representation is disproportionately high. The disproportional representation of African-American students overall and especially in the category of Serious Emotional Disturbance should be emphasized because of the high rate of co-occurrence between ADD and oppositional/defiant and conduct disorders, which constitute the bulk of problems seen in the SED category. Similarly, the over-representation of Hispanic Americans in the OHI category is of interest because of its availability as a special education option for students with ADD and because the specific nature of the disabilities served in OHI currently are not well documented.

Given the relationships between low SES, poverty status, and the prevalence of minority students in particular categories of special education - where we are likely to find students with ADD, there is reason for concern about the potential for over-identification of minority students with ADD.

Unfortunately, the research literature that addresses multicultural issues in the assessment of ADD with large samples is sparse. Although ADD has been studied internationally in both English-speaking and other language countries, this literature is not responsive because different racial/ethnic groups were not directly compared. Clearly, a great deal of additional work is needed in this area.

Educational Assessment of ADD

Assessing Primary Characteristics

Since the relative severity of the ADD symptoms of inattention, impulsivity and hyperactivity can vary among children and since each may impair academic performance and social-emotional functioning in different ways, it is important that all three constructs be measured. As stated earlier in this synthesis, the literature on the educational characteristics of students with ADD and its co-occurrence with other conditions indicates that the classification of ADD should recognize at least two subtypes: ADD with and without hyperactivity.

Assessing Co-occurring Disabilities

The research literature on ADD indicates that ADD can co-occur with learning disabilities in at least ten percent to twenty percent of cases when stringent identification criteria are applied for both conditions, although the prevalence of co-occurrence varies from nine percent to sixty-three percent across studies. Similarly, consistently higher rates of co-occurrence are reported between ADD and disruptive behavior disorders marked by aggression, oppositional-defiant behavior and conduct problems. The evidence for the presence of co-occurring emotional problems is less consistent, but becomes significant for girls with ADD as they approach adolescence. Therefore, if a student is suspected of having ADD, it is reasonable to suspect the student may also have co-occurring LD and/or emotional/behavior disorder (EBD). This implies that appropriate instruments would be used to

include or exclude the presence of these problems as part of a comprehensive assessment strategy.

Defining the Severity of ADD

As noted earlier in this synthesis (see the Introduction and Review of Instruments for Assessing ADD), DSM diagnosis is based on the number of symptoms presented that exceed a specified threshold, and severity is assessed rather subjectively. Instruments keyed to DSM-III and III-R have the advantage of assessing the severity of symptoms more objectively in terms of the number that exceed the required threshold, as well as overall severity based on average ratings. However, these instruments have less extensive norms compared to most multifactor, empirically derived instruments. On the other hand, empirically derived instruments do not always measure all of the three primary characteristics of ADD or measure them neatly apart from other types of problem behaviors. Thus, these instruments tend to contaminate inattention with passivity or immaturity and hyperactivity with aggression or defiant behavior.

In general, the recommended solution to this problem is to seek confirmatory evidence for the diagnosis of ADD from DSM-keyed instruments by using multifactor instruments which are relevant to ADD and can be used to assess co-occurring emotional and behavioral problems. While there is no generally agreed-upon statistical cut-off for severity level as assessed by standardized measures, the tendency in the research literature is to use a two-standard deviation cut-off, which is consistent with

that commonly used in special education.

Duration of Symptoms

ADD is viewed as a pervasive disorder that appears early in childhood and persists into adult life. Our review of the preschool literature suggests that ADD with hyperactivity as the major symptom along with aggressive or oppositional behavior can be identified as early as three years, and these symptoms persist reliably in a significant number of cases well into the elementary grades. However, attentional problems (ADD without hyperactivity) are less visible than activity and impulsve control problems and are typically recognized by teachers during the primary period (K-3). DSM-III-R establishes the age of onset of ADD at seven years and requires evidence of persistence for at least six months. The collection of parent and teacher interview data along with a thorough review of school records and treament history are very important with respect to these criteria.

Also, it should be noted that the principal means for dealing with these issues in special education assessment more generally is to use pre-referral intervention strategies for a specified period of time (e.g., six months) as part of the referral-assessment process. The application of these procedures would also provide an opportunity to evaluate general education accommodations specifically for ADD.

Situational and Temporal Variability

This problem in assessment is related to the latter problem in that evidence of pervasiveness is needed to show that

inattention, impulsiveness and hyperactivity are not specific to certain situations (e.g., displayed in school but not at home, or only in some school or home situations). Earlier in this paper we noted that there are essentially two assessment strategies for addressing this problem. First, instruments are available for collecting ratings of the severity of ADD symptoms in different school and home situations. However, there is a paucity of evidence on the effects of ADD symptoms on the performance of specific instructional activities and in different instructional contexts. Observational instruments for assessing ADD symptoms and, more generally, on- and off-task behavior are very suited for this purpose, as well as for planning and monitoring the effectiveness of instructional and behavioral accommodations.

Assessing Educational Characteristics and Needs

A common finding across studies in the assessment literature on ADD is that students with ADD tend to score below normal comparison samples on IQ and achievement tests, but frequently still within the normal range. Although the symptoms of ADD may impair test performance, many studies failed to control variables such as socioeconomic status and to account for co-occurring conditions. When children with co-occurring LD and problem behaviors were compared separately to those with ADD only in well-defined samples, evidence to suggest impaired ability and achievement was lacking. At the same time, functional outcomes for children with ADD in follow-up studies have been poor with respect to frequency of retention, suspension and drop-out rates.

Although these outcomes apply mainly to clinic-identified hyperactive students, there is evidence to suggest that children with ADD may become more handicapped educationally in the long term due to its association with LD and EBD and the effects of continued school failure.

In any event, the problem remains to better specify the educational characteristics of students who have only ADD without the complications imposed by other co-existing conditions. In this regard, some have argued that children with ADD display difficulties in academic productivity as assessed by work completion, on-task behavior, and accuracy of responding on academic tasks due to the inability to regulate attention and impulsve control. Attention and the ability to regulate behavior during task performance have long been known to affect academic performance, which impairs learning generally due to deficient on-task behavior. Also, it is known that these variables combine with other variables such as grade-level retention and impulsive cognitive styles to predict poor academic performance cumulatively over time.

However, as noted above, evidence of this kind is sparse for the majority of students who have only ADD and no other co-occurring disability. In this regard, we need to go beyond the ADD literature to apply currently-used methods for assessing educational needs, and in particular instructional needs. One approach that we feel should be applied is to use curriculum-based measures both in the identification of ADD students who may

require general education accommodations as opposed to special education and related services, and in planning and monitoring educational programs.

Assessing Social Adjustment and Adaptation

One of the most consistent findings in the literature on ADD is that the majority of these students have significant and persistent problems in social relationships. Also, evidence suggests that the nature of social problems is related to ADD subtypes such that while ADD children with hyperactivity are aggressive and rejected more often than normal comparison children, children with ADD without hyperactivity are more withdrawn, unpopular, but not necessarily rejected. The latter description is also similar to that for students with LD. However, with ADD, these findings have been replicated extensively by observation, sociometric techniques, and the opinions of parents, other adults, and peers. Accordingly, it is an area of assessment that would be warranted in many cases.

Summary and Conclusions

Comprehensive assessment for educational purposes is a multi-stage process that gathers data and information to make decisions about the nature of children's educational problems, their need for specialized programs and services, and the efficacy of the programs and services they receive. As described above, a number of brief DSM-keyed instruments are available for screening and identifying students with ADD who are experiencing educational and behavioral problems and may be suspected of

having a disability. Also, these instruments may indicate the need to implement pre-referral interventions that feature general education accommodations that are applicable to students with ADD.

However, if the screening phase proceeds to referral for a comprehensive assessment, the literature on the assessment of ADD indicates that a comprehensive assessment protocol would seek confirmatory evidence for the identification of ADD by using multiple methods (rating scales, observations and interviews) and information from multiple sources, including parents and teachers. Also, for the reasons discussed earlier in this paper, evidence should be obtained on the severity of ADD symptoms in multiple situations at home and in the school. In this regard, a procedure for obtaining comparative data on representative students in the same situations is useful for assessing deviance in behavior for both rating and observational measures. Also, at the classification/diagnostic stage of assessment, it would be important to classify ADD with and without hyperactivity and assess for co-occurring LD and emotional or behavior problems.

Finally, we would like to note some issues concerning educational assessment that, in our view, are unresolved by the current research literature on ADD. Some of these issues reflect the adequacy of the knowledge base, while others are procedural in nature. First, there is a need to develop consensus on what constitutes a comprehensive assessment of ADD for educational purposes. At present, we have little evidence that would tell us

about the prevalence and characteristics of children with ADD who would be identified under stringent standards. For that matter, we have little evidence about the number and characteristics of those with ADD who currently receive special education and related services, or about the nature and type of services they receive.

Second, we were disappointed by the small number of studies in the literature that assessed educationally-relevant variables that would inform us more directly about how inattention, impulsivity, and overactivity impair learning on specific instructional tasks and in different educational settings. Although progress has been made in this area, it is evident that we must apply what we know from the literature in general and special education more broadly and to conduct additional research to validate promising approaches to fill the gaps in both basic and applied research on ADD.

Third, existing literature on ADD is not adequate to guide the field with regard to what assessment data is necessary and sufficient to qualify a child with ADD for general education accommodations under Section 504 as opposed to special education and related services under IDEA. Similarly, it is not adequate to guide us with regard to developing consensus on the appropriate roles of different types of professionals in the assessment/ identification process. In sum, we believe that while further research is needed on some aspects of assessment, we also have a number of substantive procedural issues to resolve that require

Appendix A

Synthesis Methodology

ongoing professional dialogue as well.

SYNTHESIS METHODOLOGY

According to Cooper (1989), the methodology for integrating research into a synthesis of findings involves four stages prior to the public presentation of the results. The first stage is Problem Formulation, in which decisions are made about the breadth and scope of the literature reviewed, the inclusion and exclusion of particular bodies of the literature, and any operational features that should be considered, such as the definition of ADD that was used to select subjects. The second stage deals with the Data Collection procedures themselves with respect to what sources are used to access the literature, what studies are relevant and irrelevant, and how the research is organized for review. The third stage is Data Evaluation, in which decisions are made concerning which studies are most relevant and constitute the best evidence, and how stringent or liberal the criteria should be, given the state of the art of the research on the topic being considered. Finally, the stage of Analysis and Interpretation pertains to the logic and rules used to draw inferences about the general trends and conclusions across separate studies (e.g., metaanalyses, weight of the evidence, "prototype studies", case study methods).

In the remainder of this section, we will describe our methodological approach to the organization of the literature on the assessment and identification of ADD and our procedural plan for conducting the synthesis using Cooper's (1989) framework for the overall process.

Problem Formulation

In this section we will describe the procedural steps we took to (a) determine what literature should be reviewed that is relevant to issues in the assessment and identification of ADD, (b) how that literature was organized to accomplish the synthesis task, and (c) how we selected specific articles for detailed review for possible inclusion in the synthesis. First, we will describe the operational plan for the synthesis process and its procedural steps. These steps are outlined in Figure 1.

Operational Plan for Identifying Relevant Literature

Based on our initial review of previous comprehensive syntheses of the general literature on ADD (e.g., Barkley, 1990; Shaywitz and Shaywitz, 1988), we concluded that the published literature could be divided into three broad groups for the purpose of data collection (i.e., access and retrieval of literature). One broad group included studies regarding assessment/identification; the second included studies regarding intervention/treatment; and the third included a generic literature, e.g. publications designed for parents, opinion and commentary, as well as related but not central topics such as multicultural studies, family studies and preschool studies.

The broad area of intervention and treatment could be distinguished easily from the rest of the literature on the basis of the title of the publication or abstract in most cases. In each of the search procedures described below, we were able to exclude those studies which were not relevant to the purposes of our synthesis. The only point of overlap between the studies

pertaining to assessment/identification of children and youth with ADD from other, generic literature pertaining to this topic.

Decisions About Scope and Breadth

Our goal for data collection was to develop a "reasonably exhaustive" and representative data base of original research articles. However, it is important to operationally define "exhaustive" within a given period of time to ensure that the research reflects contemporary thinking about the disorder as well as the representativeness of the research that has been done.

Since contemporary views and debate on the definition of ADD followed the publication of DSM III in 1980 and its revision, which changed the definition, in 1987 (DSM-III-R), we elected to exclude publications from our data base that appeared prior to 1980 except when the articles prior to 1980 pertained to assessment instruments that are currently in use. Also, since we knew that work was in progress on DSM IV, we extended the review of published work through 1992 and used members of our advisory board and the Professional Group for Attention and Related Disorders (PGARD) to monitor progress with DSM IV through 1993.

We should note that what is considered to be exhaustive is operationally defined and limited to the search procedures used to access the literature. Accordingly, our literature base is representative of articles published in the USA and accessed through its library system via available computerized search procedures. Foreign publications were not sampled.

Organization of the Literature

relevant to identification/ assessment and those relevant to intervention and treatment involved the evaluation of treatment effects, which could be considered an assessment problem. However, these issues were accepted by the two centers synthesizing the treatment literature during the January 1992 meeting in Washington. Also at that meeting the centers synthesizing the assessment/identification literature accepted literature on epidemiological studies, associated child characteristics, and family studies because of their implications for issues concerning prevalence, variation in the definition of ADD across studies, and co-occurrence with other conditions such as LD and SED.

At the same time there was a body of literature that, while not directly relevant to assessment and identification per se, was relevant to many audiences (e.g., parents and professionals). This literature consisted of publications designed for parents, opinion and commentary concerning ADD, policy documents (e.g., SEA task force reports), and the legal literature on litigation, due process hearings, and OCR complaints. Also, there is a separate literature in multicultural and bilingual special education that is relevant to the assessment of students with ADD with respect to required procedural safeguards in measurement and test administration. Because of the heterogeneity of topics covered, we called this literature "other".

In sum, at the first stage of the synthesis process, we devised procedures to (a) exclude literature pertaining to treatment and intervention and (b) include, but separate, studies

includes the more specific topics that comprise each area of research. For example, studies of child characteristics could focus on either the primary manifestations of ADD (e.g., inattention, impulsivity and hyperactivity) or associated conditions (e.g., LD/SED) and characteristics (e.g., behavioral, social); such studies could also focus on variables that influence the manifestations of certain child characteristics. When organized in this fashion, it is easier to link the literature to particular issues (e.g., what constitutes an appropriate assessment of ADD?)

The outcome of this topical classification scheme was a bibliography of all literature we identified as relevant that was organized topically and that could be assessed readily by researchers and other interested parties in the field for their own purposes.

Selection of Articles for Synthesis

At this point it is important to specify three factors that might influence the validity of the review and its conclusions. We have identified at least three factors that may be problematic.

(1) As we indicated above, there are at least three types of definitions used to select research samples in the literature which include (a) the DSM-III definition, (b) the DSM-III-R definition, and (c) definitions that are specific to the purpose of the study. In our review of individual studies we coded and grouped studies by type of sample definition and exclude studies that

The ultimate goal for the project was to synthesize the literature on the assessment and identification of ADD to address the critical issues that had been identified by the Congress, the agency, and by input from various parent and professional groups. As the result of efforts to achieve consensus on the issues that would be addressed by each center and of discussions during the January meeting in Washington, a list of issues was identified that would be addressed by our center.

Because the scientific literature is organized conceptually by research topics, it has not been possible to access the literature directly based on descriptors that reflect the final issues. (Instead, issues are often stated in the form of questions which, when answered, inform decision-makers about alternative positions, policies, and solutions to practical problems). Therefore, it was necessary to first determine those research topics in the literature that were most relevant to assessment and identification of children and youth with ADD and then determine whether particular publications were relevant to one of more of the issues that were addressed.

To accomplish this task, we developed a topical classification scheme to organize the literature base around specific research topics related to assessment and identification, e.g., definitions of ADD, assessment instruments and procedures, identification criteria, educational needs, prevalence, preschool and multicultural assessment. This topical classification scheme is given in the appended table entitled "Outline of Procedures for Literature Synthesis" which also

Having outlined our overall approach and initial assumptions and decisions about the organization of the literature, we will now move to the data collection phase.

Data Collection Stage

To develop a reasonably exhaustive and representative data base of research articles on ADD that is relevant to issues in assessment and identification, we devised an approach that used multiple sources for accessing the literature that were examined in a sequential fashion that would include and exclude particular publications in a nonduplicating fashion. This approach was devised to achieve economy of effort and at the same time achieve a relatively exhaustive search by checking for duplication at each stage in the sequence. Finally, we were concerned about multidisciplinary coverage and built in procedures to assess breadth of coverage. For example, based on current evidence, we suspect that we under-sampled the literature in Pediatrics and School Psychology as disciplinary areas that require an additional last check using computer and targeted index searches.

Sources and Access to the Literature

1. Extant bibliographies. As described above, we began the search process by examining two extant bibliographies that were the most recent and authoritative that were available (Barkley, 1990; Shaywitz and Shaywitz, 1988). Also, both of these sources were multidisciplinary in scope and clearly distinguished the body of literature on assessment and identification from that on intervention and treatment, as well as other topical areas (e.g., epidemiology). Therefore, we were able to use these

offered no definition or a definition that is unreasonable, given the standards of the field.

(2) Research samples varied significantly with respect to the referral and catchment procedures. Some studies used school-based samples, while the majority used clinic-referred samples. The samples varied in age, referral source, and severity of the condition. While some samples were independently drawn, others were samples of convenience. Again, we devised coding procedures to address this issue in the synthesis.

(3) Studies also varied in critical design features, the type and adequacy of measures, and the exercise of design features to enhance precision and extraneous variables.

Best Evidence Criteria

To assist us in classifying each publication and in making judgments that could be defended with respect to the inclusion or exclusion of a given study in the sample, we developed a coding sheet for deciding which articles would be annotated for the purpose of the synthesis. Therefore, instead of simply referencing each article cited in the synthesis document, we prepared an annotated bibliography of the literature that will serve as a resource to other who may wish to examine the validity of our synthesis and/or use the bibliography for other purposes. Thus, our criteria for "best evidence" were operationalized by the review process based on our coding instrument and annotated bibliography.

bibliographies and computer searches are not contemporary, given the lag in publication time and time to index and enter material into computer data banks. One advantage of the procedures we devised is that we could determine the major journal outlets for research on ADD by noting the number of publications that were found in each journal in our bibliography. This allowed us to scan the annual indexes of the top five journals in each field through the last annual volume and that of previous volumes for disciplinary areas that may have been undersampled by other procedures. For example, we observed a marked increase in publications on ADD in the school psychology literature since 1986.

4. Major author solicitation. Finally, as in most specialized areas of research, it has been found that a relatively small group of authors with extensive experience in ADD research contribute a disproportionate number of articles. Therefore, we contacted those individuals who have a high frequency of publications and requested their most recent reprints to complement our index search with respect to recency.

Data Evaluation

The procedures for data evaluation were discussed in the section on Problem Formulation above. The principal means for deciding what evidence was included in the synthesis, what constituted best evidence in a given case, and the grouping of studies that have common design features, samples and measures was addressed procedurally by using the coding sheet we devised to classify and describe the quality of evidence offered by each

bibliographies for devising criteria for subdividing the literature into three broad categories as discussed above.

2. Computer searches. Problems in relying solely on extant bibliographies are another selection bias that arises from the disciplinary focus of a given author, the search process used by a particular author, and decisions used to include and exclude the articles that were referenced (Cooper, 1989). On the other hand, computer searches by themselves are seldom exhaustive and are often confined to particular disciplinary areas, e.g. ERIC for education and PSYCH-LIT for psychology. Therefore, we conducted three multidsiciplinary computer searches to capture the literature that is indexed by ADD, ADHD, and attention-hyperactivity problems broadly. This step was an attempt to locate articles that were omitted from our extant bibliographies as well as those that might be located in the literature in one discipline but not another.

The ERIC and PSYCH-LIT searches together identified 262 references that are not cited by Barkley (1990) or Shaywitz and Shaywitz (1988) and did not involve treatment and intervention. However, it is interesting to note that only a minor proportion (11%) of the articles located were in educational publications.

Thus, the data collection approach we have followed seems to have achieved its aims in locating the bulk of the literature, which demonstrates the strengths of using multiple sources and a targeted multidisciplinary approach.

3. Index searches. A remaining problem in conducting comprehensive and exhaustive literature searches is that extant

identified that address the same conceptual hypothesis. As we note in the Problem Identification section, the synthesis of information that is relevant to the issues we have identified did not fit neatly under conceptual categories defined by the hypothesis that was tested. Second, meta-analysis requries the analysis of effect sizes from experimental-manipulative studies. Most of the designs used in the literature we synthesized were descriptive, comparative, or correlative in focus rather than comparative-causative.

However, we have used tabular/graphic illustrations to display findings that are consistent or inconsistent and relevant with regard to drawing conclusions about the weight, degree of replication, and robustness of the evidence. In this regard, the various individual articles on a given issue can be viewed as a single case that either supports or contests the validity of a general conclusion or pattern of conclusions. Thus, the aggregate of the evidence from each individual case can be used to detect emergent themes and patterns of evidence that are replicated with each successive case, building a logical argument for the validity of a general conclusion that is based on the "weight of the evidence." To the extent that the evidence from individual cases is robust, this support the conclusion on the grounds of "best evidence." Moreover, if the general thrust of the findings on a given issue (e.g., severity of disability) is observed across multiple sources of data (e.g., different types of samples or measures), the conclusions can be viewed as having a high degree of external validity. Accordingly, we have applied a case

study that is reviewed. A copy of this coding sheet is appended.

To establish initial reliability in using the coding sheet, Drs. McKinney, Montague and Hocutt evaluated the same randomly selected 20 articles. Any and all disagreements in the description and evaluation of these articles were discussed and addressed. Beyond this point, articles were selected for review by topic and assigned to each investigator, who read and summarized all of the articles on a given topic in relation to a given set of issues. Thus, for example, Dr. McKinney addressed the issues of prevalence, gender differences, and developmental course based on his review of the literature classified as epidemiology. Similarly, Dr. Montague reviewed the literature on child characteristics to summarize the literature on ADD subtypes and co-occurrence with other types of disabilities and Dr. Hocutt reviewed the literature on assessment with respect to preschool children, ethnic/multicultural issues and family studies. Articles that met the criteria for inclusion in the synthesis were then be coded, annotated, and grouped for analysis and integration.

Analysis and Interpretation

Generally, there are two broad approaches to data analysis that attempt to integrate information across separate research studies, quantitative syntheses or meta-analyses (Cooper, 1989) and qualitative analysis such as case study methodology (Ogawa & Malon, 1991). There are two reasons why we believe that meta-analysis was not an appropriate technique for our purposes. First, meta-analysis requires that a series of studies be

study approach based on successive replication to integrate the evidence, which is similar in procedures to that illustrated by the work of Ogwa and Malen, 1991.

References

Barkley, R. A. (1990). Attention-defricit hyperactivity disorder: A handbook for diagnosis and treatment. New York: Guilford Press.

Cooper, H. M. (1989). Integrating research: A guide for literature reviews. Newbery Park, CA: SAGE Publications.

Ogasa, R. T. & Malen, B. (1991). Toward rigor in review of multivocal literature: Applying the exploratory case study method. Review of Educational Research, 61(3), 265-286.

Shaywitz, S. E. & Shaywitz, B. A. (1988). Attention-deficit disorder: Current perspectives. In J. F. Kavanagh and T. J. Truss (Eds.), Learning disabilities: Proceedings of the national conference. Parkton, MD: York Press.

Appendix B

TABLE 1

Representative Studies of the Characteristics of Attention Deficit Disorder

STUDY	SAMPLES	SOURCE	MEASURES	FINDINGS/CONCLUSIONS
Zentall, S., & Smith, Y. (1992). Assessment and validation of the learning and behavioral style of hyperactive children. Learning and Individual Differences, 4, 25-41.	(Grades 2-7, 90% male) Hyperactive (n=114) Normal Comparison (n=133)	School School	Diagnostic (DSM III-R) IOWA-CTRS SNAP$_1$ Dependent Math-Learning Preference Questionnaire	FINDINGS *H > N Preference for higher levels of social stimulation. *Older > younger children preference for more background auditory/visual stimulation. CONCLUSIONS *Hyperactive children may be more social and kinesthetic learners than nondisordered children. *Children prefer more stimulation for math facts than problem solving. *Older children report better learning with more sensory stimulation. *Learning style as determined by self reports may be important for instruction of hyperactive children.
Frick, P.J., Kamphaus, R.W., Lahey, B.B., & Loeber, R. (1991). Academic under-achievement and the disruptive behavior disorders. Journal of Consulting and Clinical Psychology, 54(2), 289-294.	(Ages 7-12, males) ADHD (n=111 - /H, 97; /wo, 14) Control (n=42)	Clinic Clinic	Diagnostic (DSM-III-R) Interviews WISC-R BASIS	FINDINGS *Association found between academic under-achievement and ADD and CD; however, when CD controlled, only ADD was associated with under-achievement. *ADD/wo and control did not differ on ability/achievement discrepancy. CONCLUSIONS *More research needed to investigate subgroups of ADD and under-achievement. *Under-achievement appears associated with ADD.

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Table 1 (Con't.)

Hynd, G.W., Lorys, A.R., Semrud-Clikeman, M., Nieves, N., Huettner, M., & Lahey, B.B. (1991). ADD without hyperactivity and neurocognitive syndrome. Journal of Child Neurology, 6, 37-41.	ADDH (n=10) (mean age 11.5) ADD no H (n=10) (mean age 12.9)	Clinic Clinic	Diagnostic (DSM-III and DSM-III-R for co-diagnoses) WISC-R Rating Scales Academic Measures Rapid Naming Tests Interviews (SADS Personality Inventory)	FINDINGS *40% ADDH codiagnosed as CD whereas no ADD no H were so diagnosed. *60% ADD no H received diagnosis of developmental academic disorder whereas no ADDH were so diagnosed. *ADDH and ADD no H differed on mathematical achievement with ADD no H performing significantly more poorly. *ADD no H performed significantly less well on RAN/RAS tasks. *ADDH seen as more active and impulsive than ADD no H. *Parents of ADDH children expressed more concern about social skill development. CONCLUSIONS *High degree of variation in ADD populations. *Under-achievement characterized ADD no H group. *Support for clinically and conceptually divergent groups of ADDH and ADD no H children. *Children with ADD no H may have right hemispheric dysfunction.
Milich, R. & Okazaki, M. (1991). An examination of learned helplessness among ADHD boys. Journal of Abnormal Child Psychology, 19(5), 607-623.	(Age 9-11, Males) ADHD (n=23) Control (n=22)	 Clinic Clinic	Dependent Attribution Scale Puzzle Tasks Self-evaluation Scale	FINDINGS *ADHD > control optimism prior to task completion. *ADHD < control task performance persistence. CONCLUSIONS *ADHD children, when confronted with failure experiences, exhibit learned helplessness. *Questions appropriateness of effort attribution training for ADHD children given that they attribute failure to effort.

Table 1 (Con't.)

Barkley, R., DuPaul, G., & McMurray, M. (1990). Comprehensive evaluation of attention deficit disorder with and without hyperactivity as defined by research criteria. Journal of Consulting and Clinical Psychology, 58, 755-789.	(Ages 6-12, 75% male) ADD + H (n=42) ADD - H (n=48) LD (n=16) Control (n=34)	Clinic Clinic Clinic Community	Diagnostic (DSM-III) Child Behavior Checklist Child Attention Checklist Dependent Parent Interview CBCL HSQ Conners Parent Self Reports on Affective and Adjustment Variables Teacher CBCL SSQ ADHD Rating TOPS WISC-R WRAT-R CPT MFFT Direct Observation	FINDINGS *Both subtypes - inattention, poor behavioral adjustment, poor academic adjustment, poor social adjustment. *ADD+H > ADD-H Lack self control; greater impulsivity; more internalizing and externalizing behaviors; greater risk for antisocial behavior/ODD/CD; more ADD, aggression, and substance abuse in families; more commission errors on vigilance test; behavioral, organizational problems; disinhibition problems. *ADD-H > ADD+H Low performance on coding subtask, more on-task behavior on vigilance task, less aggression, impulsivity and overactivity, less situational pervasiveness of conduct disorders, fewer peer relationship problems, mental preoccupation, slow cognitive tempo. CONCLUSIONS *ADD+H and ADD-H *"may be dissimilar psychiatric disorders with qualitatively different attentional styles rather than subtypes of a shared disturbance in the same attentional component."*
Barkley, R.A., Fisher, M., Edelbrock, C.S., & Smallish, L. (1990). The adolescent outcome of hyperactive children diagnosed by research criteria: I. An 8-year prospective follow-up study. Journal of the American Academy of Child and Adolescent Psychiatry, 29, 541-557.	(Ages 4-12, 80% male) (Ages 12-28 follow-up) ADHD only (n=25) ADHD+ODD/CD (n=53) No ADHD or ODD/CD (n=20) Normal (n=60)	Clinic Clinic Clinic Community	Diagnostic (DSM-III) Rating Scales HSQ Dependent Parent Psychiatric Interview Student Interview	FINDINGS *ADHD+ODD/CD 2 to 5 times the rate of cigarette and marijuana use than ADHD only and normals. *ADHD (all groups) 3 times more likely to have failed a grade, suspended, or expelled. *Fathers of ADHD more antisocial than fathers of normals. *ADHD family status changed more than normals. CONCLUSIONS *ADHD children are substantially more at risk for negative outcomes in domain of psychiatric, social, legal, academic and family functioning than normal children.

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Table 1 (Con't.)				
Breen, M., & Altepeter, T. (1990). Situational variability in boys and girls identified as ADHD. Journal of Clinical Psychology, 46(4), 486-490.	(Ages 6-11) ADHD boys (n=30) ADHD girls (n=30)	 Clinic Clinic	Diagnostic (DSM-III-R) Interview CBCL CTRS Dependent HSQ SSQ	FINDINGS *Boys > girls SSQ during recess, during lunch, in hallways, total score, unsupervised settings. CONCLUSIONS *Few gender differences on SSQ; no gender differences on HSQ. *Boys may have more behavior problems on unstructured school time.
Halperin, J.M., Newcorn, J.H., Sharma, V., & Healey, J.M. (1990). Inattentive and nonattentive ADHD children: Do they constitute a unitary group? Journal of Abnormal Child Psychology, 18(4), 437-439.	(Ages 6-13) ADHD (n=19) Control (n=44)	 School School	Diagnostic DSM-III-R Teacher Ratings CPT Dependent CTRS WISC-R WRAT-R	FINDINGS *Two types - Inattentive ADHD (n=9) tend to have cognitive impairments; Nonattentive ADHD (n=10) tend to have conduct problems. CONCLUSIONS *Support for differentiation of ADD+H and ADD-H types based on presence of attentional vs. conduct problems.
Nussbaum, N.L., Grant, M.L., & Roman, M.J. (1990). ADD and the mediating effect of age on academic and behavioral variables. Journal of Developmental and Behavioral Pediatrics, 11(1), 22-26.	(Ages 6-12, males) ADD/H and ADD/wo (n=79)	 Clinic	Diagnostic (DSM-III) Interviews CTRS SSQ Parent Rating Dependent WISC-R WRAT CBC	FINDINGS *Significant correlations - age and FSIQ-WRAT arithmetic discrepancy and CBC variables social withdrawal uncommunicative. CONCLUSIONS *As ADD children grow older, they may fall further behind peers in math achievement. *ADD children perceived as aggressive and abusive in social situations. *Older ADD children more withdrawn and uncommunicative than younger children.
Zentall, S. (1990). Fact retrieval automatization and math problem solving by LD, ADD, and normal adolescents. Journal of Educational Psychology, 82(4), 856-865.	(Grades 7-8) ADD (n=33) LD (n=15) Control (n=28)	 School School School	Diagnostic (DSM-III) Rating Scales Dependent Math Tests Direct Observation of Activity Level Fact Retrieval Time	FINDINGS *LD and ADD combined > controls retrieval time. *LD > ADD and controls word problem performance. CONCLUSIONS *Slower speed in rote skills appear to indicate failure to automatize basic skills for LD and ADD students. *Computational retrieval speed is a more sensitive measure of basic skill difficulty than accuracy and is also a significant predictor of higher level problem solving.

Table 1 (Con't.)				
Breen, M., & Altepeter, T. (1990). Situational variability in boys and girls identified as ADHD. Journal of Clinical Psychology, 46(4), 486-490.	(Ages 6-11) ADHD boys (n=30) ADHD girls (n=30)	Clinic Clinic	Diagnostic (DSM-III-R) Interview CBCL CTRS Dependent HSQ SSQ	FINDINGS *Boys > girls SSQ during recess, during lunch, in hallways, total score, unsupervised settings. CONCLUSIONS *Few gender differences on SSQ; no gender differences on HSQ. *Boys may have more behavior problems on unstructured school time.
Halperin, J.M., Newcorn, J.H., Sharma, V., & Healey, J.M. (1990). Inattentive and nonattentive ADHD children: Do they constitute a unitary group? Journal of Abnormal Child Psychology, 18(4), 437-439.	(Ages 6-13) ADHD (n=19) Control (n=44)	School School	Diagnostic DSM-III-R Teacher Ratings CPT Dependent CTRS WISC-R WRAT-R	FINDINGS *Two types - Inattentive ADHD (n=9) tend to have cognitive impairments; Nonattentive ADHD (n=10) tend to have conduct problems. CONCLUSIONS *Support for differentiation of ADD+H and ADD-H types based on presence of attentional vs. conduct problems.
Nussbaum, N.L., Grant, M.L., & Roman, M.J. (1990). ADD and the mediating effect of age on academic and behavioral variables. Journal of Developmental and Behavioral Pediatrics, 11(1), 22-26.	(Ages 6-12, males) ADD/H and ADD/wo (n=79)	Clinic	Diagnostic (DSM-III) Interviews CTRS SSQ Parent Rating Dependent WISC-R WRAT CBC	FINDINGS *Significant correlations - age and FSIQ-WRAT arithmetic discrepancy and CBC variables social withdrawal uncommunicative. CONCLUSIONS *As ADD children grow older, they may fall further behind peers in math achievement. *ADD children perceived as aggressive and abusive in social situations. *Older ADD children more withdrawn and uncommunicative than younger children.
Zentall, S. (1990). Fact retrieval automatization and math problem solving by LD, ADD, and normal adolescents. Journal of Educational Psychology, 82(4), 856-865.	(Grades 7-8) ADD (n=33) LD (n=15) Control (n=28)	School School School	Diagnostic (DSM-III) Rating Scales Dependent Math Tests Direct Observation of Activity Level Fact Retrieval Time	FINDINGS *LD and ADD combined > controls retrieval time. *LD > ADD and controls word problem performance. CONCLUSIONS *Slower speed in rote skills appear to indicate failure to automatize basic skills for LD and ADD students. *Computational retrieval speed is a more sensitive measure of basic skill difficulty than accuracy and is also a significant predictor of higher level problem solving.

Table 1 (Con't.)

August, G. & Garfinkel, B. (1989). Behavioral and cognitive subtypes of ADHD. Journal of the American Academy of Child and Adolescent Psychiatry, 28(5), 739-748.	(Ages 5-14) (N=1838) ADHD (behavioral mild, n=16) ADHD (behavioral severe, n=23) ADHD (cognitive, n=11) Control (n=43)	School	Diagnostic (DSM-III-R) CTRS YCI Dependent DTLA-2 Stroop Tests MFFT CPT PMT SOT	FINDINGS *9.2 percent of sample identified as ADHD. *Group comparisons identified 3 subtypes: a. cognitive (with reading disability) b. behavioral (with CD and no reading disability) c. behavioral (w/o CD and no reading disability) CONCLUSIONS *ADHD students characterized by inattention, impulsivity and hyperactivity on a continuum of severity. *Most severe showed symptoms indistinguishable from CD. *Cognitive subtypes showed severe academic under-achievement and information processing deficits (encoding and retrieval of linguistic information). *Management strategies should be tailored to subtype needs.
Breen, M. (1989). Cognitive and behavioral differences in ADHD boys and girls. Journal of Child Psychology and Psychiatry, 30(5), 711-716.	(Ages 6-11) ADHD boys (n=13) ADHD girls (n=13) Normal girls (n=13)	Clinic Clinic Community	Diagnostic (DSM-III) CTRS PPVT Dependent Direct Observation Rating Scales Depression Index Parenting Stress Index KABC Gordon Diagnostic System SSQ CBCL	FINDINGS *ADHD boys > normal girls perception of deviance. *ADHD boys = ADHD girls on academic and behavioral measures. CONCLUSIONS *Gender differences among ADHD children may be minimal.

Table 1 (Con't.)				
Hynd, G.W., Nieves, N., Connor, R.T., Stone, P., Town, P., Becker, M.G., Lahey, B.B., & Lorys, A.R. (1989). ADD with and without hyperactivity: Reaction time and speed of cognitive processing. Journal of Learning Disabilities, 22(9), 573-580.	(Ages 6-13, 80% male) ADD/H (n=43) ADD/wo (n=22) Control (n=16)	Clinic Clinic Clinic	Diagnostic (DSM-III) Interviews Rating Scales Dependent Reaction Time Tasks Speeded Classification Tasks	FINDINGS *Group effect ADHD > CD for reaction time task. *When subjects with a co-diagnosis were eliminated, no group effect was found on speeded classification tasks. *Group effects found for within subject variability on speeded classification tasks. *Within groups variability did not distinguish groups (ADD/H and ADD/wo). *No difference on error rates. CONCLUSIONS *Subtypes not distinguished using these measures - no evidence for ADD/H and ADD/wo as separate syndrome. *ADHD children more variable in their expression of attentional capabilities.
Newcorn, G.H., Halperin, G.M., Healey, G.M., & O'Brien, J.D. (1989). Are ADDH and ADHD the same or different? Journal of the American Academy of Child and Adolescent Psychiatry, 28(5), 734-738.	(Grades 1-6, B+H, primary) males (n=42) females (n=43)	School School	Diagnostic DSM-III and DSM-III-R Item Rating Scales CTRS CPT	FINDINGS *80% did not qualify for either ADDH or ADHD. *19% qualified for ADHD. *13% qualified for ADDH. *Comparisons made on children who met both DSM-III and DSM-III-R criteria (n=16) and those meeting only DSM-III-R criteria (n=6). *Convergent validity established for DSM-III-R scale. CONCLUSIONS *DSM-III-R may identify mixed hyperactive and aggressive disorders. *Study supports separation of disorders (with and without attentional problems).

Table 1 (Con't.)				
Voelker, S., Carter, R., Pregue, D., Gdowski, C., & Lachar, D. (1989). Developmental trends in memory and metamemory in children with attention deficit disorder. Journal of Pediatric Psychology, 14(1), 75-88.	(Ages 6-12, boys) ADD-H (n=12) Control (n=12) (matched on age, IQ achievement)	Clinic School	Diagnostic (DSM-III) CPQ-hyperactivity index Interview PIC Dependent Recall Task Questionnaire	FINDINGS *ADD-H < C Recall of unclustered list of words. *ADD-H = C Strategy knowledge. CONCLUSIONS *ADD-H do not spontaneously use the clustering strategy when it is obvious and less effortful to do so. *ADD-H less likely to use a semantic organization strategy under effortful, low salient conditions, suggesting a production deficiency.
Zentall, S. (1988). Attentional cuing in spelling tasks for hyperactive and comparison regular classroom children. The Journal of Special Education, 22, 83-93.	(Grades 3-6, boys) Hyperactive (n=20) Comparison normal (n=26)	School School	Diagnostic (DSM-III-R) SNAP ATRS Dependent Spelling Tasks	FINDINGS *Hyperactive children who practiced the task with all black letters first, and color added later, outperformed comparison children. CONCLUSIONS *Color facilitates attention to detail in a spelling-recognition task. *Attention to detail in an initial exposure to a difficult task may be counterproductive for hyperactive children.
Borcherding, B., Thompson, K., Kruesi, M., Bartko, G., Rapoport, G.L., & Weingartner, H. (1988). Automatic and effortful processing in ADHD. Journal of Abnormal Child Psychology, 16(3), 333-345.	(Ages 6-12, males) ADHD (n=25) Control (n=23)	Community Community	Diagnostic (DSM-III) CTRS Observation Dependent WISC-R Processing Tasks (word lists)	FINDINGS *Recall of related words and a recognition task classifies groups at a 77% rate. CONCLUSIONS *Effortful processing tasks differentiate hyperactive and control groups, while automatic tasks did not. *Effortful processing may be related to affect, arousal, self-regulation and motivation-problem areas associated with ADHD.

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Table 1 (Cont.)				
Landau, S., & Milich, R. (1988). Social communication patterns of attention-deficit-disordered boys. Journal of Abnormal Child Psychology, 16, 69-81.	(Grades 3-6, males) ADD = 17 Normal = 18	School School	Diagnostic (DSM-III) CTRS Dependent Observation of interaction during TV Talk Show Game	FINDINGS *Behavioral differences occurred as a function of role as host or guest. *ADD < normals in moderating behavior as roles changed. *Series of significant interactions between group status and communication roles. CONCLUSIONS *ADD boys seemed to adapt a specific response strategy and then apply it relatively independent of task demands. *Findings support a more pervasive or transituational perspective of ADD behavior. *ADD children may not be able to attend to or make use of salient social or environmental cues. *ADD children may have a performance rather than skill deficit. *ADD children seem to elicit compensatory or controlling behaviors from others with whom they are paired.

Table 1 (Con't.)				
Mannuzza, S., Gittelman, K., Bonagura, N., Konig, P.H., & Shenker, R. (1988). Hyperactive boys almost grown up: II. Status of subjects without a mental disorder. General Psychiatry, 45, 13-18.	(Ages 18-23 at follow-up of 6-12) ADD (n=52) Control (n=60) (No DSM-III at follow-up)	Clinic Clinic	Diagnostic (DSM-III) Interviews	FINDINGS "Significant group differences on: a. attention* symptoms b. hyperactivity symptom c. academic performance d. behavioral adjustment e. diagnosis of ADD with hyperactivity f. diagnosis of CD g. any DSM-III diagnosis h. relationship between drug-related problems and diagnosis of SUD CONCLUSIONS *"Behavior problems resulting from drug use in early adolescence have graver consequences for previously hyperactive children than normal subjects." *"Hyperactive children who become dysfunctional as a result of drug use in adolescent should be primary candidates for vigorous clinical intervention."
Carlson, C., Lahey, B., Frame, C., Walker, J., & Hynd, G. (1987). Sociometric status of clinic-referred children with ADD with and without hyperactivity. Journal of Abnormal Child Psychology, 15(4), 537-547.	(Grades 1-6, 70-80% male) ADD/H only (n=18) ADD/H + CD (n=36) ADD/wo only (n=12) ADD/wo + CD or MD or CD/MD (n=29) Control (n=45)	Clinic Clinic Clinic Clinic School	Diagnostic (DSM-III) Interviews CTRS RBPC SNAP CBRS Dependent Sociometric Measures	FINDINGS *Both subtypes with and without codiagnosis associated with peer rejection. *ADD/H nominated more often for "fights more." CONCLUSIONS *Peer unpopularity associated with ADD/H and ADD/wo regardless of codiagnosis.

Table 1 (Con't.) Grende, M., Glass, C., & Katz, K. (1987). Hyperactive children and peer interaction: Knowledge and performance of social skills. Journal of Abnormal Child Psychology, 15, 1-13.	(Ages 7-11, males) ADHD = 15 Normal = 15	School Community	Diagnostic (DSM-III) CAQ Dependent Interview Observation Peer Interaction Tasks	FINDINGS *Type of social situation significantly affected quality of ADHD child's response. *No differences in knowledge of strategies for initiating relationships. *Maintaining relationships ADHDs less effective. *Conflict situations ADHDs less friendly, more impulsive, more assertive. *Peers rated ADHDs as less desirable partners. CONCLUSIONS *Impulsivity of ADHD Children more increased difficulty of considering long-term consequences of actions. *Most difficulty for ADHDs evidenced in structured work situations. *Validates Asher's theory that different stages of a relationship require different skills. *Deficits found in social knowledge and skills.
Hamlett, K., Pellegrini, D., & Conners, C. (1987). An investigation of executive processes in the problem-solving of attention deficit-disorder-hyperactive children. Journal of Pediatric Psychology, 12, 227-240.	(Ages 6-11) ADD-H (n=16) Normal (n=16)	Clinic School	Diagnostic (DSM-III) CTQ Dependent Memory Task (sorting) Social Communication Task (peer teaching)	FINDINGS NS - card sorting time ADD-H < Control executive processing CONCLUSIONS *ADD-H children manifest poor executive processing as demonstrated by quality of verbalized instructions and strategies compared with normal controls. *No differences in performance were noted when ADD-H children were on and off medication.

Table 1 (Con't.)

Kuehen, C., Kehle, T., & McMahan, W. (1987). Differences between children with ADD, children with SLD, and normal children. Journal of School Psychology, 25(2), 161-166.	(Ages 6-12, Males) ADD (n=30) (DSM-III) SLD (n=30) Normal (n=30)	 Clinic School School	Dependent CTRS MFFT PMT Jumbled Numbers Game	FINDINGS *Significant difference found between group on all measures except JNG. *Four measures combined for 96.7% rate for ADD classification. CONCLUSIONS *ADD compared with SLD and normal children have more problems with attention span, impulsivity, overactivity, foresight, planning. *Parent Rating Scale best predictor of measures used. *Multiple measures should be used of diagnosis of ADD.
deHaas, P.A. (1986). Attention styles and peer relationships of hyperactive and normal boys and girls. Journal of Abnormal Child Psychology, 14(3), 457-467.	(Grades 3-5) ADD/H boys (n=10) ADD/H girls (n=13) Normal boys (n=35) Normal girls (n=33)	 School School School School	Diagnostic (DSM-III) SNAP Dependent CTRS WISC-R Stroop MFFT Peer Perception Measure	FINDINGS *ADD/H > normals conduct, inattention, hyperactivity. *Males > females conduct, hyperactivity. *ADD/H boys > all other groups conduct, hyperactivity. *ADD/H girls > normal girls conduct, hyperactivity. *ADD/H > normal negative peer nominations. CONCLUSIONS *ADD/H girls displayed more behavior problems than normal girls but less than ADD/H boys. *Boys may be identified as ADD/H earlier than girls because of the behavior problems they present. *Both ADD/H boys and girls displayed attentional deficits and poor peer relationships.

Table 1 (Con't.) Johnston, C., & Pelham, W. (1986). Teacher ratings predict peer ratings of aggression at 3-year follow-up in boys with ADD with hyperactivity. Journal of Consulting and Clinical Psychology, 54(4), 571-572.	(Grades 1-3, Males) ADDH (n=54)	School	Diagnostic and Dependent Rating Scales Sociometric Measures	FINDINGS *Peer ratings on aggression improved over 3 year period for boys rated below median by teachers. CONCLUSIONS *May have implications for relationship of aggressive behavior and later pathology.
Berry, C.A., Shaywitz, B.A. (1985). Girls with ADD: A silent minority? A report on behavioral and cognitive characteristics. Pediatrics, 76(5), 801-809.	(Ages 7-12) ADD/H boys (n=72) girls (n=22) ADD/wo boys (n=30) girls (n=10) Control boys (n=62) girls (n=32)	Clinic Clinic School	Diagnostic (DSM-III) CTRS Dependent YCI	FINDINGS *ADD/H exhibit attentional, behavioral, and cognitive impairments. Whereas ADD/wo exhibit attentional/cognitive deficits. *Management problems and antisocial behaviors correlates of hyperactivity. *Increased impulsivity not associated with attentional deficits in absence of hyperactivity. *Within ADD/H group, girls demonstrated more cognitive deficits and boys displayed more disruptive behaviors. *With ADD/wo, girls showed lower self-esteem and were older at time of referral. CONCLUSIONS *Results support clinically distinct subgroups with / and wo/H. *Girls with ADD may be underidentified and cognitive deficits have a more salient role in their identification. *Behavioral disturbances increase likelihood of identification for boys.
Gittelman, R., Mannuzza, S., Shenker, R., & Bonagura, N. (1985). Hyperactive boys almost grown up: Psychiatric status. General Psychiatry, 42, 937-947.	(Ages 16-23 at follow-up of ages 6-12) ADDH (n=101) Control (n=100)	Clinic Clinic	Diagnostic DSM-III Interviews	FINDINGS *ADDH persisted in 31% of probands vs. 3% of controls. *Conduct and substance abuse disorder also distinguished groups. CONCLUSIONS *Greatest risk factor for development of antisocial behavior and drug abuse is maintenance of ADDH symptoms.

Table 1 (Con't.)				
Lahey, B.B., Schaughency, E.B., Frame, C.L., & Strauss, C.C. (1985). Teacher ratings of attention problems in children experimentally classified as exhibiting ADD with and without hyperactivity. Journal of the American Academy of Child Psychiatry, 24(5), 613-616.	(Grades 2-5, 625 children screened) ADD/H (n=10) ADD/wo (n=20) Control (n=20)	 School School School	Diagnostic (DSM-III) RBPC	FINDINGS *ADD/H > controls impulsivity answering without thinking. *ADD/wo > controls sluggishness, drowsiness. *ADD/H > ADD/wo irresponsibility, distractibility, impulsivity, answering without thinking. *ADD/wo > ADD/H sluggishness, slowness. CONCLUSIONS *ADD with and without H may differ on core attention deficits. *Impulsivity appears to be a correlate of excess motor activity rather than of attentiveness.
deHaas, P.A. & Young, R.D. (1984). Attention styles of hyperactive and normal girls. Journal of Abnormal Child Psychology, 12(4), 531-546.	(Grades 1-2, females) ADD/H (n=24) Control (n=24)	School School	Diagnostic (DSM-III) Checklist Dependent CTRS Motor Problems Inventory MFFT WISC-R Stroop Tests Discrimination Task Draw-a-Line Test	FINDINGS *ADD/H > Controls errors on MFFT and Discrimination Task. CONCLUSIONS *ADD/H girls did not show impulsivity and conduct problems as boys generally do. *ADD/H have shorter attention span and less concentration than normal girls. *CTRS profiles of girls with ADD/H similar to ADD/H boys. *CTRS cutoff scores for boys may not be appropriate for girls.
Edelbrock, C., Costello, A.J., & Kessler, M.D. (1984). Empirical corroboration of ADD. Journal of the American Academy of Child Psychiatry, 23(3), 285-290.	(Ages 6-11, males) ADD/H (n=18) ADD/wo (n=7) Control (n=62)	Clinic Clinic Clinic	Diagnostic (DSM-III) CBCL Dependent CBCL	FINDINGS *ADD > controls inattentive scale. *ADD/H > ADD/wo nervous - overactive scale. CONCLUSIONS *Findings corroborate distinction between ADD with and without hyperactivity. *ADD had poorer school performance, worked less hard in school, behaved less appropriately, and learned less.

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Table 1 (Con't.)				
August, G. & Stewart, M. (1982). Is there a syndrome of pure hyperactivity? British Journal of Psychiatry, 140, 305-311.	(Ages 5-12, males) Hyperactive (n=34) Hyperactive with CD (n=42)	 Clinic Clinic	Diagnostic Interview Rating Scales Clinical Diagnosis Dependent Behavior Rating Scales Developmental History WISC-R WRAT	FINDINGS *H/CD > H aggression non-compliance *H/CD > H verbal IQ CONCLUSIONS *"Pure hyperactivity is an elusive concept and probably defines a heterogeneous group of children whose primary problems are cognitive in nature."
King, C. & Young, R.D. (1982). Attentional deficits with and without hyperactivity: Teacher and peer perceptions. Journal of Abnormal Child Psychology, 10(4), 483-496.	(Grades 2-4, males) ADD/H (n=22) ADD/wo (n=9) Control (n=27)	 School School School	Diagnostic (DSM-III) SNAP Dependent CTRS Sociometric Measures Self-Concept Scale	FINDINGS *ADD/H > ADD/wo conduct problems hyperactivity. *Both groups > control inattention, negative peer perceptions. CONCLUSIONS *Associated characteristics and negative peer perceptions place ADD children *"at risk."*
Tant, J., & Douglas, V. (1982). Problem-solving in hyperactive, normal, and reading-disabled boys. Journal of Abnormal Child Psychology, 10(3), 285-306.	(Ages 7-12, males) Hyperactive (n=36) Reading Dis (n=25) Normal (n=36) (matched on age and verbal IQ)	 School School School	Diagnostic CTRS PPVT Oral Reading Test MFF Dependent Matrix Solution Tasks	FINDINGS *H < N and RD on problem solving tasks. CONCLUSIONS *H tended to guess more frequently and to be generally less efficient problem solvers than other two groups. *RD performance on problem solving tasks fell between the H and N groups but closer to N. *Attentional problems may have greater determinist effect on problem solving than reading ability.

Table 2

Representative Study of the Coexistence of Attention Deficit Disorder and Learning Disabilities

STUDY	SAMPLES	SOURCE	MEASURES	FINDINGS/CONCLUSIONS
Dykman, R., & Ackerman, P.T. (1991). ADD and specific reading disability: Separate but often overlapping disorders. Journal of Learning Disabilities, 24(2), 96-103.	(Ages 7-11) ADD - Males (n=153) Females (n=29) Control (n=52)	Clinic Clinic Community	Diagnostic (DSM-III) WISC-R WRAT Rating Scales DICA Laboratory Tasks	FINDINGS *ADD/H 40 Percent. *ADD/H + aggressivity 30 percent. *ADD/WO H or Agg 31 percent. * > 50 percent reading disabled. *Ratio for RD Males to Females 9.2:1.0. *RD males < NRD males on IQ. CONCLUSIONS *Some evidence for validity of 3 behavioral subgroups. *Important to screen for RD in samples of ADD children.
Ackerman, P.T., Dykman, R.A., & Gardner, M.Y. (1990). ADD students with and without dyslexia differ in sensitivity to rhyme and alliteration. Journal of Learning Disabilities, 23(5), 279-283.	(Ages 7-11) ADD (n=83) ADD + Dyslexia (n=82) Control (n=52)	Clinic Clinic Clinic	Diagnostic DICA WISC-R WRAT Dependent Bradley Phonological Sensitivity Test	FINDINGS *C < A < D total errors. *C = A < D Middle and first sound errors. CONCLUSIONS *Nearly 50 percent of ADD groups had dyslexia. *Forty-six (46) percent of ADD + D group exhibited modest to severe impairment in phonological sensitivity.

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Table 2 (Con't.)				
August, G.J., & Garfinkel, B.D. (1990). Comorbidity of ADHD and RD among clinic-referred children. Journal of Abnormal Child Psychology, 18(1), 29-45.	(Ages 7-17) ADHD (n=70) ADHD + RD (n=45) Control (n=50)	Clinic Clinic School	Diagnostic (DSM-III-R) Comprehensive Clinical Evaluation with Interview PPVT-R-ADHD only WRAT CTRS DTLA-2 Dependent DTLA-2 Stroop Color and Word Test PMT SOT	FINDINGS *Controls > ADHD > ADHD + R achievement, lexical decoding, letter sequences. *Controls > both subgroups word opposites, sentence imitation, word sequences, attentional measures. *Controls = ADHD > ADHD+RD rapid naming. CONCLUSIONS *Thirty-nine (39) percent of ADHD had coexisting RD. *Spelling impairment characterizes older ADHD+R student. *Attentional problems do not discriminate RD subgroup. *Modicum of support for specific cognitive deficits associated with RD. *Coexistence of two distinct disorders likely to increase functional problems.
Felton, R.H., & Frank, B.W. (1989). Cognitive deficits in reading disability and attention deficit disorder. Journal of Learning Disabilities, 22(1), 3-13	(Ages 6-8) Males (n=268) Females (n=216)	School School	Diagnostic (DSM-III) Rating Scales DICA Dependent Tests of Reading Tests of Cognitive Skills Tests of Nonverbal Functions Tests of Sensorimotor Functions	FINDINGS *ADD effects in memory domain. *RD effects in recall and phonemic awareness. CONCLUSIONS *Data show clear separation of ADD and RD effects. *RD highly specific to naming and phonemic awareness, deficits.

Table 2 (Con't.) Lamowski, K., & Nay, S.M. (1989). Locus of control in children with LD and hyperactivity: A subgroup analysis. Journal of Learning Disabilities, 22(6), 381-393.	(Ages 7-9, Males) ADD/H ADD/H-LD LD Control	Not specified	Diagnostic (DSM-III) ATRS SNAP PIAT WISC-R Dependent Locus of Control Scale	FINDINGS *ADD/H-LD = > ADD/H and controls on total LC score. *LC scored significantly related to discrepancy scores. CONCLUSIONS *Children with learning problems were more external in locus of control with ADD/H-LD showing highest scores. *Treatment may need to vary according to academic problems, locus of control orientation, and affective characteristics.
Felton, R.H., Wood, F.W., Brown, I.S., Campbell, S.K., Harter, M.R. (1987). Separate verbal memory and naming deficits in ADD and reading disability. Brain and Language, 31(1), 171-184.	(Ages 8-12) LD (n=45) NLD (n=53)	School School	Diagnostic (DSM-III) DICA Dependent Word Retrieval Tests Rapid Automatized Naming Tests Verbal Memory Tests Verbal Fluency Tests	FINDINGS *Recall tasks unrelated to ADD or RD. *Verbal fluency tasks significant for RD and ADD groups. *Deficits in rote verbal learning and memory a function of ADD. *Deficits in word retrieval and rapid naming specific to RD. CONCLUSIONS *Supports distinct groups of RD and ADD children. *Cognitive deficits may underlie attentional problems of ADD and RD children.

Table 2 (Con't.) Ackerman, P.T., Anhalt, G.M., Dykman, R.A., & Holcomb, P.J. (1986). Effortful processing deficits in children with reading and/or attention disorders. Brain and Cognition, 5, 22-40.	(Ages 8-9 Males) ADD/WO (n=21) ADD/H (n=24) RD (n=24) Control (n=24)	Clinic Clinic Clinic School	Diagnostic (DSM-III) CTRS WISC-R WRAT Dependents Encoding Tasks List Learning Tasks Memory Tasks Rapid Arithmetic Tasks Paper and Pencil Arithmetic Tasks	FINDINGS *Clinical groups < control memory for low imagery computational efficiency. CONCLUSIONS *Attentional disorder may impede automatization of number facts. *RD children also exhibit attentional deficit.
Allen, T. (1986). Styles of exploration in control, ADD/H, and LD children. Journal of Learning Disabilities, 19(6), 351-353.	(Ages 8-10) LD (n=14) ADD/H (n=14) Control (n=14)	Unspecified	Diagnostic (DSM-III) CTRS	FINDINGS *LD and ADD/H > controls on rate of decrease in fixation time to repeated stimulus. *LD and ADD/H > controls in longer looking time on high salient dimensions. CONCLUSIONS *More rapid rate of habituation for LD and ADD/H children. *Faster rate indicated children were encoding fewer dimensions of the Standard Stimulus. *LD and ADD/H children may be sensitive only to changes in stimuli that are highly salient; thus questioning stimulus seeking behavior theory of LD and ADD.

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Table 2 (Con't.)				
Carlson, C.L., Lahey, B.B., & Neeper, R. (1986). Direct assessment of the cognitive correlates of ADD W and WO hyperactivity. Journal of Psychology and Behavioral Assessment, 8(1), 69-86.	(Grades 2-5) ADD/H (n=20) ADD/WO (n=15) Control (n=16)	LD and BD classes Regular classes	Diagnostic (DSM-III) SNAP Dependent CELF DTVMI BASIS Rapid Naming Task Visual Match-to-Sample Task DTLA-Visual Attention Span Task Stroop Color Distraction	FINDINGS *ADD/H < ADD/WO and control FISQ, Verbal IQ. *ADD groups < Control Spelling, Reading. *ADD/WO < control Math. *ADD groups < Control Stroop Tasks and one error measure. CONCLUSIONS *ADD groups appear deficient - sustained visual attention - academic achievement - cognitive abilities *ADD/WO deficient in math. *ADD groups show similar patterns of cognitive performance except in area of verbal intelligence. *Differences between ADD/H and ADD/WO may be more behavioral than cognitive.
Holcomb, P.J., Ackerman, P.T., & Dykman, R.A. (1986). Auditory event-related potentials in attention and reading disabled boys. International Journal of Psychophysiology, 3, 263-273.	(Ages 8-11, Males) ADD/H (n=23) ADD/WO (n=21) RD (n=24) Control (n=23)	Clinic Clinic Clinic School	Diagnostic Conners HI WISC-R WRAT Dependents Auditory ERP Tasks	FINDINGS *Clinical groups < control overall amplitude and two other components. *Latency did not discriminate groups. CONCLUSIONS *Similar results obtained for parallel visual study. *Results of both auditory and visual studies indicate that cognitive ERPs can be quite sensitive to various types of developmental deficits. *Functional significance of findings unspecified as yet.

Table 2 (Con't.)

Halpern, J.M., Gittelman, R., Klein, D.F., & Rudel, R.G. (1984). Reading-disabled hyperactive children: A distinct subgroup of ADD/H? Journal of Abnormal Child Psychology, 12, 1-14.	(Ages 6-12, >90% Males) ADD/H (n=62) ADD/H & RD (n=22)	Unspecified	Diagnostic (DSM-III) CTRS WISC-R WRAT Dependent Raven's MFFT PMT CEF Pardue Pegboard DTVMI Goodenough Test Pain Associates Test Sequential memory	FINDINGS *Of 211 ADD/H children, 9 percent were RD and 26 percent were pure hyperactive. *Mixed group < pure on verbal IQ but > on performance IQ. *Mixed > pure MFFT. CONCLUSIONS *Data failed to indicate clear differences between hyperactive children with and without RD.
Ackerman, P.T., Dykman, R.A., & Oglesby, D.M. (1983). Sex and group differences in reading and attention disordered children with and without hyperkinesis. Journal of Learning Disabilities, 16(7), 407-415.	(Ages 7-10) Hyperactive girls (n=9) boys (n=24) RD girls (n=10) boys (n=19) Hyp/RD girls (n=6) boys (n=10) ADD (presumably) girls (n=12) boys (n=12)	Clinic Clinic Clinic Clinic	Diagnostic CTRS WISC-R WRAT Gray Oral Reading Test Dependent MFFT CEFT Color Naming Various Cognitive Measures	FINDINGS *Sex differences found for WISC-R measure WRAT arit aggressivity personal inventory CEFT self-rated augmentation *For girls verbal IQ associated with reading. *For boys, sequential memory associated with reading. *Within and across sexes, groups could be discriminated by WISC-R profiles, arithmetic scores, and aggressivity ratings. CONCLUSIONS *Sufficient evidence of sex differences to mandate stringent matching or adjustment in future research. However, consideration of sex differences may be more relevant for research than educational practice. *Girls are a more homogeneous group than boys.

Table 3

Representative Studies of the Coexistence of Attention Deficit Disorder and Oppositional or Conduct Disorder

STUDY	SAMPLE	SOURCE	MEASURES	FINDINGS/CONCLUSIONS
Forness, S.R., Youpa, D., Hanna, G.L., & Cantwell. (1992). Classroom instructional characteristics in ADHD: Comparison of pure and mixed subgroups. Behavioral Disorders, 17(2), 115-125.	(Ages 8-11, Males) ADHD (n=30) ADHD + ODD or CD (n=41)	Clinic Clinic	Diagnostic (DSM-III-R) CTRS Interview Dependent WISC-R PIAT WRMT KMDT DBM of Reading	FINDINGS *ADHD > ADHD + ODD or CD *WRMT comprehension. *KMDT *5-15% of sample qualified for LD diagnosis. Conclusions *Mixed group underachieving compared with pure ADHD group.

Table 3 (Con't.)

Pelham, W., Evans, S.W. Gnagy, E., & Greenslade, K. (1992). Teacher ratings of DSM-III-R symptoms for the disruptive behavior isorders: Prevalence factor analysis, and conditional probabilities in a special education sample. School Psychology Review, 21(2), 285-299.	(Ages 5-19, Males) (n=364)	Special Education Classes	Diagnostic (DSM-III-R) DBD Rating Scale	FINDINGS •Forty-three (43) percent of children sampled met criteria for diagnosis of one of DSM-III-R disruptive behavior disorder. ADHD 17% ADHD + 1% ADHD+CD+ODD 6% ADHD+ODD 14% CD 1% ODD 3 CD+ODD 1% CONCLUSIONS •Presence of disruptive behavior disorders were quite high and were substantially overlapping in the sample. •Most of the overlap is between ADHD and ODD. •Same pattern of overlap reported in a previous study of a normative sample. •Teacher information about CD is insufficient for diagnosis employing DSM criteria. •ODD and CD covary int he special education population as observed by teachers. •Two factors (inattention and impulsivity/overactivity) emerged. •Rating scale items may have a valuable purpose as exclusionary criteria.

Table 3 (Con't.)

Barkley, R.A., Fisher, M., Edelbrock, C.S., & Smallish, L. (1991). The adolescent outcome of hyperactive children diagnosed by research criteria: III. Mother-child interactions, family conflicts and maternal psychopathology. Journal of the American Academy of Child and Adolescent Psychiatry, 32, 233-255.	(Ages 4-12, 80% Males) (Ages 12-20) ADHD only (n=25) ADHD+ODD/CD (n=53) No ADDH or ODD/CD (n=20) Normal (n=60)	Clinic Clinic Clinic Community	Diagnostic Rating Scales HSQ Dependent PPVT Rating Scale HSQ Interaction Questionnaire Issues Checklist Adjustment Scales Psychopathology Scales Direct Observation	FINDINGS *Behavior problems and their persistence as well as mother-child interactions, continue to be significantly greater in hyperactive than normal children at adolescent follow-up. *Severity of behavior problems decline over time. *Presence of ODD/CD with ADHD greatly increases parent-adolescent strife. *ADHD = normals in perception of conflicts with mothers. *Discrepancy between mothers' and teens' reports of family conflicts. *Less rewarding and facilitating mothers likely to remain so into adolescence. *ODd/aggression associated with maternal depression and marital discord. CONCLUSIONS *Preschool conduct problems and maternal controlling behavior have significant stability over time and are predictive of conduct problems and mother-child conflicts into adolescence.

Table 3 (Con't.)				
Barkely, R.A., Fisher, M., Edelbrock, C.S., & Smallish, L. (1990). The adolescent outcome of hyperactive children diagnosed by research criteria: I. An 8-year prospective follow-up study. Journal of the American Academy of Child and Adolescent Psychiatry, 29, 541-557.	(Ages 4-12, 80% Male) (Ages 12-20 follow-up) ADHD only (n=25) ADHD+ODD/CD (n=53) No ADHD or ODD/CD (n=20) Normal (n=60)	Clinic Clinic Clinic Community	Diagnostic (DSM-III) Rating Scales HSQ Dependent Parent Psychiatric Interview Student Interview	FINDINGS *ADHD+ODD/CD 2 to 5 times the rate of cigarette and marijuana use than ADHD only and normals. *ADHD (all groups) 3 times more likely to have failed ag rade, suspended, or expelled. *ADHD family status changed more than normals. CONCLUSIONS *ADHD children are substantially more at risk for negative outcomes in domain of psychiatric, social, legal, academic and family functioning than normal children.
Halperin, J.M., O'Brien, J.D., Newcorn, G.H., & Healey, J.M. (1990). Validation of hyperactive aggressive, and mixed hyperactive/aggressive childhood disorders: A research note. Journal of Child Psychology and Psychiatry, 31(3), 455-459.	(Grades 1-5) N=65	Low income parochial school	Diagnostic (DSM-III-R) Dependent Iowa Conners CPT MFFT WISC-R, Digit Span Test Reading and math scores from school records.	FINDINGS *Hyperactive (n=4) Aggressive (n=15) Hyp/Agg (n=19) Normals (n=47) *Hyp > all groups inattention. *Hyp/Agg > Agg + normals impulsivity. CONCLUSIONS *Evidence of validity for groups. *High rate of aggression in sample may be associated with low SES. *Hyperactivity may be related less to environmental factors. *Data do no support notion of ADHD as a condition in which inattention is the central deficit.

Table 3 (Con't.) Livingston, R.L., Dykman, R.A., & Ackerman, P.T. (1990). The frequency and significance of additional self-reported psychiatric diagnoses in children with ADD. Journal of Abnormal Child Psychology, 18(5), 465-478.	(Ages 7-11) ADD males (n=153) females (n=29)	Clinic	Diagnostic (DSM-III) WISC-R WRAT Rating Scales DICA Laboratory Tasks	FINDINGS *Total Sample Reading Impaired 40% Anxiety/Mood Disorder 30% Separation Disorder 14% ODD 39% CD 11% *Males only ADD 27% ADD/H 45% ADD/H + Aggression 28% CONCLUSIONS *Referral Rate 5:1 (males to females). *Over 1/4 males rated hyperactive/ aggressive. *Over half had additional DICA diagnoses (ODD and anxiety/mood disorders most common). *Males with internalizing diagnoses had lower verbal IQs and poorer attention. *Subjects with externalizing diagnoses rated as more aggressive and had sociopathic thrill-seeking profiles on self-reports.

Table 3 (Con't.)

Spitzer, R.L., Davies, M., & Barkley, R.A. (1990). The DSM-III-R field trial of distruptive behavior disorders. Journal of the American Academy of Child and Adolescent Psyciatry, 29(5), 690-697.	(Ages 7-12, 73% Males) N=550	Clinic	Diagnostic (DSM-III-R) Interview Checklist	FINDINGS *ADHD 56% ADHD only 35% ADHD+ODD 30% ADHD+CD 25% ADHD + nondisruptive mental disorder 12% *ODD 28% ODD only 21% ODD+ADHD 67% ODD + nondisruptive mental disorder 12% *CD 24% CD only 35% CD+ADHD 67% CD + nondisruptive mental disorder 11% *Nondisruptive mental disorder only 29% *No mental disorder 5% CONCLUSIONS *Agreement between clinical diagnosis and DSM-III-R diagnosis variable across 72 sites and only fair for ADHD and poor for ODD. *Tendency for DSM-III-R diagnosis to be associated with greater comobidity. *Cut-off scores appropriate for ages 6-12. *Recommends higher cut-off for preschool.

Table 3 (Con't.)

Milich, R., Widiger, T.A., & Landau, S. (1987). Differential diagnosis of ADD and conduct disorders using conditional probabilities. Journal of Consulting and Clinical Psychology, 55(5), 762-767.	(Ages 6-12, Males and 2 year follow up) (Original sample, N=100) ADD only (n=24) CD only (n=20) ADD+CD (n=10) Another or deferred diagnosis (n=46) (Follow up sample, N=46) ADD only (n=28) CD only (n=6) ADD+CD (n=12) No DSM-III diagnosis (n=30)	Clinic Clinic	Diagnostic (DSM-III) DICA-P	FINDINGS *ADD only 37% CD 8% ADD+CD 16% No disorder 39% CONCLUSIONS *Researchers and clinicians need to broaden their perspectives regarding relation between a specific symptom and the diagnosis. *Some symptoms are more effective inclusion criteria than others. *Some symptoms (e.g., "doesn't *listen*" and "*easily distracted*") had little utility as inclusion criteria but were excellent exclusion criteria for CD and ADD respectively. *Symptoms diagnostic utility needs to be evaluated empirically.
Walker, et al. (1987). Comparison of specific patterns of antisocial behavior in children with CD with or without hyperactivity. Journal of Consulting and Clinical Psychology, 55(6), 910-913.	(Ages 6-13) ADD/H+C (n=21) CD only (n=14)	Clinic Clinic	Diagnostic and Dependent (DSM-III) K-SADS CTRS CPRS SNAP CSRS Dependent only Sociometric Measures	FINDINGS *Children with both CD and ADHD exhibited more physical aggression and a greater variety and severity of antisocial behaviors than ADD/H children. *Children with ADD/H+CD were young at time of referral than ADD/H children CONCLUSIONS *Results suggest that coexistence CD and ADD/H is associated with a more serious form of conduct disorder.

Table 3 (Con't.) Shapiro, S., & Garfinkel, B. (1986). The occurrence of behavior disorders in children: The interdependence of ADD and Cd. Journal of the American Academy of Child Psychiatry, 25, 809-819.	(Ages 7-12) Girls (n=153) Boys (n=162)	School School	Diagnostic and Dependent CTRS DICS Attentional Battery SRA Achievement Tests	FINDINGS *No symptoms differentiated inattentive-overactive (ADD) from aggressive-oppositional (CD) child. *Overall, children with ADD, CD were more impulsive and disorganized than non identified children.
August, G., Stewart, M., & Holmes, C.S. (1983). A four-year follow-up of hyperactive boys with and without CD. British Journal of Psychiatry, 143, 192-198.	(Ages 13-14 likes at follow-up) Hyperactive (n=22) Hyp/CD (n=36)	Clinic Clinic	Diagnostic (DSM-III) Interviews WRAT Stanford Diagnostic Reading Inventory	FINDINGS *Nineteen (19) hyperactive boys diagnosed as ADD (86%) ADD/H = 12 ADD/WO = 7 ADD/CD = 0 ADD/LD = 3 *Twenty-five (25) hyp/CD diagnosed as ADD (83%) ADD/H = 24 ADD/WO = 1 ADD/CD = 11 ADD/H+LD = 4 ADD/H+LD+CD = 1 CONCLUSIONS *Inattention and impulsivity remained relatively stable in both subgroups with overactivity diminished for hyperactives. *Hyperactivity in childhood does not necessarily lead to major behavior problems in adolescence. *Early aggressive under-socialized CD associated with antisocial and delinquent behaviors in adolescence. *Support for 2 types of hyperactive children: a) ADD/H+Cd aggression, at risk for delinquency b) ADD/H only higher prevalence of cognitive problems

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Table 4

Selected References Regarding Assessment and Identification of ADD in Preschool Children

Reference	Subjects	Source	Measures	Major Findings and Conclusions
Campbell, S.B., Pierce, E.W., March, C.L., Ewing, L.J., & Szumowski, E.K. (in press). Hard-to-manage preschool boys: Symptomatic behavior across context and time. Child Development.	42 boys with teacher-identified problems 27 boys with parent-identified problems 43 classroom controls (of teacher-identified boys) At follow-up two years after initial data collection, data are available on 100 problem boys (89%) and 37 (86%) controls.	Preschools; clinics; pediatricians' offices	At initial data collection: Maternal interview Stanford-Binet Intelligence Scale (Form L-M) Actometer Observations during free play Observations during toy clean-up task Observations during self-regulation tasks Observations in pre-school classrooms At follow-up: Continuous Performance Test Matching Familiar Figures Test Actometer	• Adult reports of hard-to-manage behavior in preschool-aged boys often do reflect actual difficulties with the control of activity, impulsivity, noncompliance, and aggression in children and are not age-inappropriate expectations on the part of the adults; boys in the problem group were more active, inattentive, noncompliant and irritable in different settings, i.e. home, preschool and lab, and with different people, i.e. their mothers, the examiner, the preschool teacher and their peers. • Children who were identified as problems two years earlier continued to differ from comparison youngsters on age-appropriate measures of impulsivity and activity obtained in the laboratory at age 8. • Persistent problems reflect a combination of more severe initial difficulties that affect functioning across settings and relationships; these difficulties may be exacerbated when the family environment is more chaotic and less supportive.

Table 4 (Con't.)

Barkley, R.A., Fisher, M., Edelbrock, C.S., & Smallish, L. (1991). The adolescent outcome of hyperactive children diagnosed by research criteria-III Mother-Child interactions, family conflicts and maternal psychopathology. Journal of Child Psychology & Psychiatry, 32, 233-255.	123 hyperactive; 66 control	Clinic-referred (hyperactive children)	Peabody Picture Vocabulary Test Revised Conners Parent Rating Scale Home Situations Questionnaire Interaction Behavior Questionnaire Issues Checklist Locke-Wallace Marital Adjustment Beck Depression Inventory Symptom Checklist 90, Revised Reynolds Adolescent Depression Scale Adolescent Life Events Scale Parent-Adolescent Interaction Coding System	• At follow-up (8 years after initial assessment) when hyperactive group had a mean age of 15, 72 percent met DSM-III criteria for diagnosis of ADHD. • Although the severity of problems had declined over time, the hyperactive group was rated as having more conduct problems, hyperactivity, impulsivity, and learning problems. • Preschool conduct problems and maternal controlling behavior have significant stability into late childhood and are predictive of conduct problems and mother-child conflicts into adolescence.
Campbell, S.B., March, C.L., Pierce, E.W., Ewing, L.J., & Szumowski, E.K. (1991). Hard-to-manage preschool boys: Family context and the stability of externalizing behavior. Journal of Abnormal Child Psychology, 19, 301-318.	42 boys with teacher-identified problems 27 boys with parent-identified problems 43 classroom controls	Preschools; clinics; pediatricians' offices	At initial data collection: Maternal interview Behar Preschool Behavior Questionnaire CES-D At follow-up: LES SNAP Observations of toy-clean-up task Child Behavior Checklist	• Both teacher-identified and parent-identified problem boys came from less well-functioning families than comparison boys. Consequently, the relationship between children's behavior problems and family stress cannot be interpreted as merely reflecting any elevated symptom ratings of overwhelmed mothers. • Mothers of problem children (regardless of referral source) were more negative and controlling toward their sons. • Forty-two percent of the original problem group either met DSM-III criteria for ADDH or received a score above the 95th percentile on an externalizing scale of the Child Behavior Checklist at one-year follow-up. • There appears to be an interaction between family stress (including family histories of psychopathology) and child behavior problems.

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Table 4 (Con't.)

Campbell, S.B., & Ewing, L.J. (1990). Follow-up of hard-to-manage preschoolers: Adjustment at age 9 and predictors of continuing symptoms. Journal of Child Psychology & Psychiatry, 31, 871-889.	29 problem children; 25 controls	Parent-referred (Problem children)	Family Background Interview Life Experiences Survey Scoring of observations of audiotapes SNAP Questionnaire Child Behavior Checklist NIMH Diagnostic Interview Schedule for Children (parent version) Teacher Report Form	• At follow-up (at age 9), there was a marked persistence of externalizing problems in children identified as hard-to-manage during the preschool years. • Early child behavior, severity of prior symptoms of hyperactivity and aggression, the nature of maternal control strategies at age 3, and ongoing family stress continued to predict problems, particularly symptoms of ADDH and conduct disorder, at age 9.
Barkley, R.A., Fisher, M., Edelbrock, C.S., & Smallish, L. (1989). The adolescent outcome of hyperactive children diagnosed by research criteria: I. An 8-year prospective study. Journal of the American Academy of Child and Adolescent Psychiatry, 29, 546-557.	123 hyperactive children; 66 controls	Clinic-referrals	Structured interviews Rating scales Parental self-report measures Psychological/neuropsychological tests Videotapes of math problem-solving in clinic room Videotapes of mother-teenager interaction	• While the age of onset for ODD and CD within the hyperactive group occurred at 6 years according to retrospective parent reports, the mean age of onset for ADHD symptoms was 3.7 years. • Outcomes for hyperactive adolescents was significantly inferior to those for normal adolescents: three times as many hyperactive students had failed a grade, been suspended or expelled, and almost 10 percent (compared to 0% for controls) had quit school.
Cantwell, D.P. & Baker, L.B. (1989). Stability and natural history of DSM-III childhood diagnoses. Journal of the American Academy of Child and Adolescent Psychiatry., 28, 691-700.	151 children, initially ranging in age from 2.3 to 15.9 years of age, with a mean age of 5.9 years.	Community speech/language clinic referrals	Speech/language assessment Academic achievement tests Intellectual tests Psychiatric assessment by board-certified child psychiatrist	• Follow-up data (collected four years after initial assessment) revealed high stability for only three DSM-III diagnoses: infantile autism, attention deficit disorder with hyperactivity, and oppositional disorder. • Follow-up data showed no predictive validity for ADD without hyperactivity; none of the children originally identified as having ADD without hyperactivity received the same diagnosis four years later.

Table 4 (Con't.)

Glutting, J.J. & McDermott, P.A. (1988). Generality of test-session observations to kindergarteners' classroom behavior. Journal of Abnormal Child Psychology, 16, 527-537.	155 children (80 males, 75 females) ranging in age from 60 to 71 months.	Community	Stanford Binet Observational Schedule Guide to the Child's Learning Style Cooperative Preschool Inventory-Revised Edition Goodman Lock Box	• Because of the statistically significant but low relationship between psychologists' test observations and classroom behaviors exhibited by kindergarten children, home and classroom data are necessary to accurately assess behavior. • Inferences generated through test observations need to be informed in environments of concern through behavior rating scales: such scales fulfill requirements that certain forms of childhood maladjustment, e.g. ADD, be based on assessments from multiple contexts.
Beitchman, J.H., Wekerly, C., & Hood, J. (1987). Diagnostic continuity from preschool to middle childhood. Journal of the American Academy of Child and Adolescent Psychiatry. 26, 694-699.	98 out of initial sample of 129	Physicians, pediatricians, day care centers and nursery schools	Bilahen-McRoberts Scale of SES Background Information Diagnosis (by psychiatrist) based on DSM-III categories Child Interview (at follow-up) WISC-R Child Behavior Checklist Conners' Teacher Questionnaire	• The diagnostic groups showing the greatest stability over the five-year period between initial assessment and follow-up were developmental delay and ADD: 86 percent of developmentally delayed and 77 percent of ADD children received the same diagnosis five years later. • Within the ADD group, diagnostic stability was particularly evident for ADD children with hyperactivity.

Table 4 (Con't.)

Campbell, S.B. (1987). Parent-referred problem three-year-olds: Developmental changes in symptoms. Journal of Child Psychology and Psychiatry, 28, 833-845.	29 problem children; 19 control children (out of original sample of 46 problem children and 22 controls)	Parent referrals	Child Behavior Checklist Werry-Weiss Peters Activity Scale Behar Preschool Questionnaire Maternal Interview	• Although all parent-identified problem 3-year olds had improved on measures of problem behaviors, by age 6 half had improved so that they no longer had significant problems with overactivity, concentration, restlessness and disobedience; half had persistent problems; one third had ADD. • Children with persistent problems had stable symptom problem ratings at ages 3, 4 and 6 and had been rated higher on measures of antisocial / aggressive behavior than improved problem children. • A conflicted mother/child relationship and ongoing family stress and disruption are associated with persistent problems. • There as a correspondence between teacher reports and maternal interview and questionnaire data.
Earls, F. & Jung, K.G. (1987). Temperament and home environment characteristics as causal factors in the early development of childhood psychopathology. Journal of the American Academy of Child and Adolescent Psychiatry, 24, 491-498.	95 (48 boys, 47 girls): 71 percent of 134 families comprising 1979 and 1980 cohorts in the Martha's Vineyard Child Health Survey	Birth cohorts in epidemiological study	Maternal interview (demographic characteristics; history) Evaluation of child temperament using *"age-graded questionnaires"* Preschool Behavior Checklist	• While none of the home environment characteristics were found to predict behavior problems at age 3, the temperament characteristics of high activity, low adaptability, high intensity and negative mood at age 2 are significantly related to behavior problems at age 3; these characteristics may represent a vulnerability to the development of later disorders. • Sex differences in the development of behavior problems emerge around the second year of life: for males, temperament characteristics appear important initially, but once they are established, stressful home environments become important in determining the severity and persistence of the problems.

Table 4 (Con't.)

Campbell, S.B., Breaux, A.M., Ewing, L.J., Szumonski, E.K. & Pierce, E.W. (1986). Parent-identified problem preschoolers: Mother-child interaction during play at intake and one-year follow-up. Jounral of Abnormal Child Psychology, 14, 425-440.	35 problem children; 19 control children (out of original sample of 36 problem children and 22 control children)	Parent referrals	Structured initial interview assessing developmental and family history Observations of mother-child interaction Actometer	• Children in problem and control groups less active, less inattentive, and less impulsive at age 4 than at age 3, indicating developmental change; however, children in the problem group were more aggressive and physically active than children in control group. • Mother-child interaction in problem group was more positive and less conflicted than at age 3; however, mothers of problem children provided more direction during play, were more likely to refocus children's play behavior, and made more negative control statements than mothers of control children.
Paifrey, J.S., Levine, M.D., Walker, D.K., & Sullivan, M. (1985). The emergence of attention deficits in early childhood: A prospective study. Developmental and Beahvioral Pediatrics, 6, 339-348.	174 children with mixed backgrounds	Intensive educational/diagnostic early education program	Health/behavior questionnaire Developmental, psychological, neurological evaluations performed by psychologist, physician and nurse Psychological evaluations performed at 30 months and entry into kindergarten Behavioral Impressions Summary Kindergarten Performance Profile Bayley Developmental Scales Teacher Observations	• While 41 percent of children met criteria for definite or possible concerns re: problem behaviors during the first 5 years of life, and 13 percent met criteria for definite concerns, definite and persistent concerns were found in 5 percent regarding chronic inattention, distractibility, disorganization, poor self-monitoring, impulsivity, and overactivity. • Children aged 36 to 42 months produced the greatest number of concerns, leading authors to the conclusion that this period is critical for detecting symptoms and considering prompt intervention. • The group with persistent inattention was most severely impaired by second grade on every parameter.

Table 4 (Con't.)

Campbell, S.B., Breaux, A.M., Ewing, L.J. & Szumonski, E.K. (1984). A one-year follow-up study of parent-referred hyperactive preschool children. Journal of the American Academy of Child Psychiatry, 23, 243-249.	35 problem children; 19 control children (out of initial sample of 46 problem children and 22 controls)	Parent referrals	Behar Preschool Questionnaire Observations of free play Werry-Weiss Peters Activity Scale Cookie Delay Task Matching Familiar Figures Test Preschool Embedded Figures Test Actometer	• One year after initial assessment, maternal reports and laboratory measures indicated continuing difficulties for problem children with regard to high activity level, inattention, poor impulse control, and impaired relationships with peers. • Despite positive developmental changes for both problem and control children, the problem children continued to have more problems at follow-up. • Stability of the data plus the fact that more severely impaired children were lost to follow-up suggest that attention deficit disorder can be identified in very young children and that early difficulties reported by parents may reflect more than a transient developmental phase.
Fischer, M., Rolf, J.E., Hasazi, J.I., & Cummings, L. (1984). Follow-up of a preschool epidemiological sample: Cross-age continuities and predictions of later adjustment with internalizing and externalizing dimensions of behavior. Child Development, 55, 137-150.	541 children out of original 1251 members of Vermont epidemiological survey; between 2 and 6 years of age at original data collection	Community	Vermont Behavior Checklist Child Behavior Checklist	• At follow-up (7 to 9 years following the original data collection period), "externalizing" behavior (e.g., hyperactivity, conduct disorder) showed much more stability over time than "internalizing" behavior (e.g., inhibition, withdrawal). • Preschool externalizing symptoms were positively correlated with later externalizing and internalizing symptoms; however, discontinuity rather than continuity of behavioral adjustment from preschool to later ages is the rule.
Weissbluth, M. (1984). Sleep duration, temperament, and Conners' rating of three-year-old children. Developmental & Behavioral Pediatrics, 5, 120-123.	60 three-year-old children	Pediatrician (author)	Behavioral Style Questionnaire Conners' Abbreviated Parents' Questionnaire	• There is a general relationship between sleep duration and temperament of three-year-old children similar to that observed when same children were 4 to 8 months old. • Three characteristics of a difficult temperament (slow adaptation, high intensity, negative mood), increased activity ratings, and difficult temperament are associated with brief sleep duration and high Conners' ratings.

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Table 4 (Con't.)

Campbell, S.B. & Breaux, A.M. (1983). Maternal ratings of activity level and symptomatic behaviors in a nonclinical sample of young children. Journal of Pediatric Psychology, 8, 73-82.	123 mothers who completed a questionnaire on their children's behavior	Mothers of children between 2 and 5 years of age	Behar Preschool Questionnaire Werry-Weiss Peters Activity Scale Demographic/history form	• While 11.3 percent of the mothers noted they had problems with their children's behaviors *"sometimes,"* 1.6 percent indicated more frequent problem behaviors. • Mothers' ratings were consistent across the two instruments. • Children rated most active in everyday situations also rated higher on symptoms of hyperactivity and aggression / hostility.
Cohen, N.J., & Minde, K. (1983). The hyperactive syndrome in kindergarten children: Comparison of children with pervasive and situational symptoms. Journal of Child Psychology & Psychiatry, 24, 443-455.	39 hyperactive children; 10 control children. Hyperactive children divided into three groups: 14 pervasively hyperactive, 14 situationally hyperactive, and 13 *"clinically"* hyperactive	Community; clinics	Psychiatric Interview Conners' Behavior Rating Scale Richman-Graham Scale of emotional/ social adjustment in preschoolers Wechsler Preschool Intelligence Test Primary Self-Concept Inventory Matching Familiar Figures Test What Happens Next Test Preschool Interpersonal Problem Solving Test Observations of mother/child interaction Classroom observations	• The clearest differentiation among the clinical subgroups (Pervasive, Situational, and Clinical Hyperactivity) emerged when the children were observed in interaction with their mothers or in the classrooms. The findings support direct observation as a diagnostic tool.
Mash, E.J. & Johnston, C. (1983). Parental perceptions of child behavior problems, parenting self-esteem, and mothers' reported stress in younger and older hyperactive and normal children. Journal of consulting and Clinical Psychology, 52, 68-99.	40 families with hyperactive child; 51 families with non-hyperactive child	Referral by physicians, pediatricians, psychologists, and other community professionals	Conners' Aggravated Rating Scale Child Behavior Checklist Parenting Sense of Competence Scale Parenting Stress Index	• Child characteristics emerged as major source of stress, particularly child's degree of bother and distractibility. • Mothers of hyperactive children reported more stress related to parent-child interaction, lower levels of parenting self-esteem, fewer feelings of competence, receiving less comfort from parenting role, more social isolation and self-blame, and more lack of attachment to child. • Most of the differences in reported stress were for mothers of younger (average age of 5 years,1 month) hyperactive children. • Mothers' feelings about themselves as parent correlated to husbands' perceptions of child as problematic, but fathers' feelings about their skill/knowledge as parents did not correlate with wives/perceptions of child as a problem.

Table 4 (Con't.)

Prior, M. & Leonar, A. (1983). A comparison study of preschool children diagnosed as hyperactive. Journal of Pediatric Psychology, 8, 191-207.	25 hyperactive children; 20 controls; ages between 2 years 9 months and 5 years 6 months	Large-scale study of hyperactive children in Australia	Werry-Weiss Peters Activity Scale Parent Temperament Questionnaire Parental Attitude Inventory Behar Preschool Behavior Questionnaire Observations of mother/child interaction in the home Stanford Binet	• The two groups differed on an activity factor obtained from both rating and observational measures and on "*manageability*", a factor which included a number of temperament variables (mood, distractibility, persistence, activity, rhythmicity, adaptability and intensity). • Preschool teacher and parent ratings both suggested overall greater behavior disturbance in the hyperactive group.
Rubin, K.H. & Clar, M.L. (1983). Preschool teacher ratings of behavioral problems: Observational, sociometric, and social cognitive correlates. Journal of Abnormal Child Psychology, 11, 273-285.	123 four-year-old children	Eight preschools in Ontario	Behar Preschool Behavior Questionnaire Observations of free play Preschool Interpersonal Problem Solving Test Social Problem Solving Test Rating of popularity	• Behar Preschool Behavior Questionnaire a useful, reliable, and valid instrument for assessing children who are experiencing problems. • Children rated highly on the Hyperactive/Distractible factors of the PBQ engaged in negative (rough and tumble play) and immature (solitary-functional) behaviors, were not popular among their peers, and were characterized by immature and nonadaptive play styles (unlike the Hostile-Aggressive children). • Children rated highly on the Hostile/Aggressive factors of the PBQ engaged in more negative peer exchanges and rough and tumble play, were more likely to suggest trade/bribe strategies with peers, more likely to engage in dramatic play, and were not popular among their peers.

Table 4 (Con't.)

Campbell, S.B., Szumowski, E.K., Ewing, L.J., Gluck, D.W. & Breaux, A.M. (1982). A multidimensional assessment of parent-identified behavior problem toddlers. Journal of Abnormal Child Psychology, 10, 569-592.	46 problem children; 22 controls	Parent referrals (problem children)	Behar Preschool Behavior Questionnaire Werry-Weiss Peters Activity Scale Maternal structured interview Stanford-Binet Observations during free play Cookie Delay Task Matching Familiar Figures Test Draw A Line Slowly Test Preschool Embedded Figures Test Actometer	• Very young children perceived by parents as active, inattentive, and difficult to discipline do differ from nonproblem control children on a range of laboratory and parent report measures, indicating that symptoms of attention deficit disorder and related behavior problems can be identified in 2- and 3-year old children. • Laboratory measures confirm parental complaints. • Parent-identified problem children change activities more during free play, engage in more very short activities of 20 seconds or less, engage in fewer activities lasting 2 minutes or more, more likely to flit from one thing to another with shifts occurring in rapid succession, more often off-task and out-of-seat. • A combination of parent-report and laboratory measures may best discriminate problem children from control children; also, laboratory measures appear to contribute significant and independent variance to discriminant function equation.

Table 4 (Con't.)

Reference	Subjects	Source	Measures	Major Findings and Conclusions
Mash, E.J. & Johnson, C. (1982). A comparison of the mother-child interaction in younger and older hyperactive and normal children. Child Development, 53, 1371-1381.	43 hyperactive children (18 younger; 25 older) 53 control children (28 younger; 25 older) Younger hyperactive children had average age of 4 years, 11 months	Referrals from physicians, psychologists, psychiatrists, and other community professionals	Observations of mother-child interactions in playroom during unstructured play and structured task situations	• Mothers of hyperactive children were more directive and negative during play, and were less responsive to child-initiated interactions. • Younger hyperactive children in particular asked more questions, were more negative and less compliant, were least responsive to mothers' directions or interactions; their rates of noncompliant and negative behavior were more than double the rates of older hyperactive children. • Mothers of young hyperactive children were confronted with such high rates of oppositional behavior combined with demands for direction and performance that there were low opportunities for non-task related interactions.
Milich, R., Landau, S., Kilby, G. & Whitten, P. (1982). Preschool peer perceptions of the behavior of hyperactive and aggressive children. Journal of Abnormal Child Psychology, 10, 497-510.	86 boys ranging in age from 3.25 to 6.67 years	Preschool programs, Head Start programs, day care classrooms, and nursery schools	Peer Perception Inventory Conners' Teacher Rating Scale SNAP	• Using the SNAP (based on DSM-III criteria), 14 (16%) of boys identified as ADD with hyperactivity. The aggression and sociability (but not the hyperactivity) scales of the Peer Perception Inventory discriminated between those boys identified as ADDH and those not so identified. • Teacher ratings of children with behavior problems significantly agreed with peer nominations of popularity or rejection. • While boys nominated as aggressive were more rejected by classmates, boys nominated as hyperactive were either more popular and/or more rejected.

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Table 4 (Con't.)

Reference	Subjects	Source	Measures	Major Findings and Conclusions
Buss, D.M., Block, J.H., & Block, J. (1980). Preschool activity level: Personality correlates and developmental implications. Child Development, 51, 401-408.	129 children (65 males, 64 females) 3 years old at initial testing	Ongoing longitudinal study of ego and cognitive development in children	Actometer California Q Set (personality)	• When reliability improved by the use of multiple rather than one-shot measures, appreciable coherence of personality can be discerned as early as three years of age, a coherence which remains discernible over appreciable lengths of time. • Activity level not only related to other motoric behavior, but also to interpersonal modes of functioning; highly active children seem to take advantage of others, assert themselves more than other children, are more competitive and manipulative and are less obedient and compliant.

Table 5

Literature Relevant to Multicultural Issues in Assessment and Identification of ADD

Reference	Subjects	Source	Measures	Major Findings and Conclusions
Offord, D.R., Boyle, M.H. & Racine, Y. (1989). Ontario child health study: Correlates of disorder. Journal of the American Academy of Child and Adolescent Psychiatry, 28, 856-860.	2,659 children	Unspecified	Child Behavior Checklist Survey Diagnostic Instrument Similar checklists designed for parents, teachers and adolescents. Interviewers with female head of household.	• Based on information provided by parents, the variables that have significant relationship with a diagnosis of hyperactivity are family dysfunction and failing a grade. • Based on information provided by teachers and or children, the variables that have a significant relationship with a diagnosis of hyperactivity are (in order of strength) low income, family dysfunction and chronic illness (tied), sex (male), and age (12-16). • The identification of childhood disorder is much influenced by the perception of informants and the contexts in which the assessments are done.

Table 5 (Con't.)

Szatmari, P., Offord, D.R., & Boyle, M.H. (1989). Correlates, associated impairments and patterns of service utilization of children with ADD: Findings from the Ontario child health study. Journal of Child Psychology and Psychiatry, 30, 205-217.	2,659 children	Community	Household Record Card Interviewer-administered questionnaires Questionnaire filled out by mothers Survey Diagnostic Instrument Child Behavior Checklist	• Variables that made a significant contribution to the discrimination between ADDH and non-ADDH children were: being on welfare, health problems, developmental status, family dysfunction, sex, and urban living. • Being on welfare was associated with ADDH to a greater extent for girls than for boys, possibly because girls are less vulnerable for developmental reasons. • When other disorders (e.g., conduct disorder) were controlled for, the variables that made a significant contribution to the discrimination between ADDH and non-ADDH children were: chronic health problems, developmental problems, young age, and urban living. neither being on welfare, family dysfunction, nor sex contributed to a diagnosis of ADDH when conduct disorder is removed as a possible confounding variable.
Holborrow, P.L., Berry, P. & Elkins, J. (1984). Prevalence of hyperkinesis: A comparison of three rating scales. Journal of Learning Disabilities, 17, 411-417.	1908 children	7 elementary schools	Conners Parent-Teacher Questionnaire Queensland Scale Pittsburg Adjustment Scale	• Higher percentages of hyperactive children attended school located in low Socioeconomic areas; this finding held true across all three rating scales.
McGee, R., Williams, S. & Silva, P.E. (1984). Background characteristics of aggressive, hyperactive, and aggressive/hyperactive boys. Journal of the American Academy of Child Psychiatry, 23, 280-284.	489 seven-year old boys	Dunedin (New Zealand) Multidisciplinary Child Development Study	SRA Verbal Form (measure of maternal mental ability) Eysenk Personality Inventory Parental Attitude Research Instrument Maisloe Inventory Family Environment Scale	• Boys with aggressive and/or hyperactive behavior problems came from disadvantaged home backgrounds. However, disadvantage was not strictly SES-based; it arose from possible impairment of parenting skills associated with low maternal mental ability, poor maternal psychological health, parental separation and single parent,a nd poor family relationships. These likely interacted with varying degrees of cognitive impairments and other behavioral problems in the boys to limit their ability to cope with stresses in their environments.

Table 5 (Con't.)

Achenbach, T.M., & Edelbrock, S.W. (1981). Behavioral problems and competencies reported by parents of normal and disturbed children aged four through sixteen. Monographs of the Society for Research in Child Development, 46, (1, Serial No. 188).	1300 children referred for outpatient mental health services, and 1300 randomly selected non-referred children.	28 outpatient mental health settings located in mid-Atlantic states; community (controls).	Child Behavior Checklist Items designed to measure social competence (culled from several scales).	• Of all the major demographic variables (i.e., race, SES, gender and age) used in the analysis, race clearly showed the smallest differences in reported behavior problems: five significant effects in 1666 regression analysis and 14 significant effects in 119 analysis of covariance. Minimal proportions of variance in reported behavior problems (1-6%) were accounted for by race. • SES differences in reported behavior problems were somewhat greater than racial differences: 13 significant effects in the regression analysis and 3 significant effects in the analysis of covariance. Again, minimal proportions of variance in reported behavior problems were accounted for by SES. • Age and sex differences were larger on the CBCL than were race and SES differences. However, clinical status (i.e., referred children v. non-referred children) was most strongly related to CBCL and social competence ratings.
Edelbrock, C. & Achenbach, T.M. (1980). A topology of child behavior profile patterns: Distribution and correlates for disturbed children aged 6-16. Journal of Abnormal Child Psychology, 8, 441-970.	2583 children (1050 boys aged 6-11; 633 boys aged 12-16; girls aged 6-11; and 500 girls aged 12-16). Racial composition: 78.4 percent white and 21.6 percent black.	East Coast mental health facilities(e.g., child guidance clinics, community mental health facilities, health maintenance organizations, and private practices).	Child Behavior Profile	• Demographic variables (SES, race) had small effects and were inconsistent across age and sex groups. • However, where racial effects were found, black males were over-represented in the hyperactive group and under-represented in the schizoid group; black girls were under-represented in the hyperactive groups and over-represented in the delinquent group. Racial differences were found only for boys and girls aged 6-11, not for older children.

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Table 5 (Con't.)				
Lambert, N.M., Sandoval, J. & Sassone, D. (1978). Prevalence of hyperactivity in elementary school children as a function of social system definers. American Journal of Orthopsychiatry, 48, 447-463.	5212 children (4245 in public schools; 711 in parochial schools; and 257 in private schools).	Schools around the San Francisco area.	Parent interviews Nominations by physicians Nominations by teachers/principals/ school psychologists Medical evaluation forms (for physician-referred children).	• Prevalence rates were somewhat higher "than expected" for lower SES groups and lower than expected for middle-class families. • Hyperactive children identified at all socioeconomic levels of the population. • The proportion of black children defined as hyperactive only by the school (not parents or physicians) was considerably higher than that of other ethnic groups at third through fifth grades. One explanation might be the interaction of black children's behavior and the classroom environment.
Eaves, R. (1975). Teacher race, student race, & the behavior problem checklist. Journal of Abnormal Child Psychology, 3, 1-9.	458 fourth and fifth grade boys; 33 sets of teachers (1 black, 1 white teacher).	Regular education classroom sin two rural Georgia school systems.	Behavior Problem Checklist	• White teachers consistently had statistically significant differences in their behavior ratings of black and white children; they rated black children as more deviant and white children as less deviant. • Black teachers had no such differences in their behavior ratings. • The conclusion was that either white teachers are more susceptible to racial stereotyping than black counterparts or that the behavior that occurs in class may be caused by an interaction between races.

Table 6

Mother-Child Interactions

STUDY	SAMPLES	SOURCE	SELECTION CRITERIA	FINDINGS/CONCLUSIONS
Barkley, R.A., Fisher, M., Edelbrock, D. & Smallish, L. (1991). The adolescent outcome of hyperactive children diagnosed by research criteria: III-mother-child interactions, family conflicts and maternal psychopathology. Journal of child Psychology and Psychiatry and Allied disciplines, 32, 233-255.	123 hyperactive children; 6 controls	Clinical	CPRS-Revised Werry-Weiss Peters Activity Scale	• Preschool conduct problems and maternal controlling behavior have significant stability into late childhood and are predictive of conduct problems and mother-child conflicts into adolescence.
Campbell, S.B. & Ewing, L.J. (1990). Follow-up of hard-to-manage preschoolers: Adjustment at age 9 and predictors of continuing symptoms. Journal of Child Psychology and Psychiatry and Allied Disciplines, 31, 811-889.	29 problem children 25 controls	Parent referrals	Parent complaints about overactivity, difficulty playing along, short attention span, tantrums and defiance Good physical health No signs of gross brain damage, severe language delay, or psychotic-like behavior	• Nature of maternal control strategies at age 3 continue to predict problems of ADDH and conduct disorder at age 9.
Jacobvitz, D. & Stroufe, L.A. (1987). The early caregiver-child relationship and ADD with hyperactivity in kindergarten: A prospective study. Child Development, 58, 1496-1504.	34 hyperactive children 34 controls matched on age and gender Subjects part of prospective longitudinal study of 267 low SES families	Parental clinics	Low socioeconomic backgrounds (high risk for later caregiving problems)	• Caregivers of hyperactive kindergartners scored sig. higher on maternal interference and overstimulating care than control caregivers.

Table 6 (Con't.)				
Barkley, R.A., Karlsson, J. & Pollad, S. (1985). Effects of age on the mother-child interactions of ADD-H and normal boys. Journal of Abnormal Child Psychology, 13, 631-637.	60 ADDH boys 60 normal boys at age levels 5-9	Clinic referrals	ADDH IQ above 80 Free of gross sensory/motor handicaps, epilepsy, gross brain damage, psychosis, autism, or severe language delay	• During free play ADDH boys were more independent from/ negative toward mothers, while mothers gave more commands and initiated fewer interactions than controls. • During structured tasks ADDH boys were less compliant, more negative and off-task, while mothers gave more commands, were more negative, initiated fewer interactions, and responded with greater control than controls. • There was improvement with age, but ADDH boys still displayed developmental lags.

Table 6 (Con't.)				
Befera, M. & Barkley, R.A. (1985). Hyperactive and normal boys and girls: Mother-child interaction, parent psychiatric status, and child psychopathology. Journal of Child Psychology and Psychiatry, 26, 439-452.	30 hyperactive children 30 normal children equally divided by sex	Clinic referrals	Diagnosis of hyperactivity by clinical child psychologist - DSM-III Parent/teacher complaints of inattention, impulsivity, restlessness and poor self-control Two (2) SD above mean for same age/same sex on Conners Parent Symptom Questionnaire and Werry-Weiss-Peters Activity Scale Onset of problems prior to age 6 Duration of problems over one year Behavior problems in 50% of settings on HSQ No deafness, blindness, severe language delay, gross neurological disorders, autism or psychosis	• Hyperactive children less compliant/more negative than normal children • Mothers of hyperactive boys gave more direction and praise than mothers of hyperactive girls or control children.

Table 6 (Con't.)				
Taver-Behring, S., Barkely, R. & Karlsson, J. (1985). The mother-child interactions of hyperactive boys and their normal siblings. American Journal of Orthopsychiatry, 55, 202-209.	16 mothers with one hyperactive and one nonhyperactive child	Clinic referrals	Diagnosis of ADDH IQ of 80 or higher No indication of gross sensory, motor, neurologic, or severe psychiatric impairment Maternal complaints on at least 50 percent of situations on HSQ Age of onset of problems prior to 6 Duration of problem behaviors of 12 months Parent ratings on CPSQ and Werry-Weiss Peters Activity Scale 2 SD from mean on same-age, same-sex normal children	• Hyperactive boys less compliant than normal siblings in mother-child interactions. • Mothers less positive toward hyperactive children during structured task situations.
Cohen, N.J. & Minde, K. (1983). The *"hyperactive syndrome"* in kindergarten children: Comparison of children with pervasive and situational symptoms. Journal of Child Psychology and Psychiatry and Allied Disciplines, 24, 443-455.	39 hyperactive children divided into 3 groups: pervasive, situational, and clinical hyperactives 10 control children	Clinic referrals (hyperactive children)	Hyperactivity Short attention span Poor impulse control	• Clearest differentiation among clinical subgroups emerged when children observed in interactions with mothers (as opposed to rating scales or tests). • Children with situationally specific hyperactivity (as opposed to pervasive or clinical hyperactivity) may have problems in part related to negative style of child management.

Table 6 (Con't.)				
Tallmadge, J. & Barkley, R.A. (1983). The interaction of hyperactive and normal boys with their fathers and mothers. Journal of Abnormal Child Psychology, 11, 565-580.	18 hyperactive boys and biological parents 18 normal boys and biological parents	Clinic referrals (hyperactive boys)	IQ above 80 Diagnosis of ADDH Onset of problems before age 6 2 SD above mean on Werry-Weiss Peters Activity Scale and Connors Abbreviated Scale	• Hyperactive boys less compliant and parents more directive than normal dyads. • Differences in interaction more noticeable in structured task settings. • Fathers and mothers did not differ in their interactions with their sons.
Mash, E.J. & Johnston, C. (1982). A comparison of the mother-child interactions of younger and older hyperactive and normal children. Child Development, 53, 1371-1381.	43 hyperactive children (18 younger; 25 older) 53 control children (28 younger; 25 older)	Referrals from professionals	2 SD above mean on Conners Abbreviated Rating Scale 2 SD above mean on Werry-Weiss Peters Activity Scale Developmental history of hyperactivity, with onset around 2-3 years of age Absence of gross neurological, sensory, or motor impairment	• Mothers of hyperactive children more directive and negative during play and less responsive to child-initiated interaction. • Younger hyperactive children 2 times more negative, less complaint, and less responsive to mothers' directions or interactions than older hyperactive children.
Webster-Stratton, C. & Eyberg, M. (1982). Child temperament: Relationship with child behavior problems and parent-child interactions. Journal of Clinical Child Psychology, 11, 123-129.	35 mother-child dyads	Community respondents (mothers of 3-5 year olds) to flyer announcing parent training program	Self-selection for parent training program	• Children perceived by mothers as more active and with low attention span had more behavioral problems and were more non-accepting and noncompliant in interactions with mothers. • Mothers of more active children more negative and non-accepting in responses to children.

Table 7

Maternal Stress

STUDY	SAMPLES	SOURCE	SELECTION CRITERIA	FINDINGS/CONCLUSIONS
Barkely, R.A., Fischer, M., Edelbrock, C.S. & Smallish, L. (1991). The adolescent outcome of hyperactive children diagnosed by research criteria: III. Mother-child interactions, family conflicts and maternal psychopathology. Journal of Child Psychology and Psychiatry and Allied Disciplines, 32, 233-255.	158 hyperactive children between 4 and 12 years 81 normal children between 4 and 12 years	Clinic referrals (hyperactives)	IQ above 80 on PPVT Free of gross sensory or motor abnormalities	• Mothers of hyperactive children reported more personal psychological distress than mothers of normal children. • Presence of oppositional defiant disorder accounted for most of differences between hyperactive and normal children on mother-child interaction, ratings of home conflicts, and ratings of maternal psychological distress.
Brown, R.T. & Pacini, J.M. (1989). Perceived family functioning, marital status, and depression in parents of boys with ADD. Journal of Learning Disabilities, 22, 581-587.	51 boys with ADD/H 34 boys in clinical control group (no ADD/H) 34 boys in nondisabled control group	Clinic referrals (ADD/H and clinical control group)	Diagnosis of ADD/H using DSM-III criteria Living with at least one biological parent No evidence of psychosis or MR	• Greater frequency of depression for ADD parents. • Depression in fathers related to greater controls and greater frequency of family activities. • Depression in mothers related to decrease in family activities.

Table 7 (Con't.)

Cunningham, C.E., Beness, B.B., & Siegel, L.S. (1988). Family functioning, time allocation and parental depression in the families of normal and ADDH children. Journal of Clinical Child Psychology, 17, 169-177.	Mothers and fathers from 26 families with ADDH children Mothers and fathers from 26 families with normal children	Referral by family physician, pediatrician, or child psychologist (ADDH only)	Diagnosis of ADDH according to DSM-III criteria 2 SD above mean on hyperactivity index of Conners Onset of symptoms prior to 4 years of age Duration of symptoms at least 1 year IQ at least 85 No neurological disorders/thought disturbance	• Mothers of ADDH children reported more depression than either their husbands or control families. • Maternal depression scores were linked to both child behavior problems and to family dysfunction, but paternal depressions cores were linked only to family dysfunction, but paternal depression scores were linked only to family dysfunction. • Mothers and fathers of ADDH children reported fewer visits with extended family members, and mothers of ADDH children found extended family contacts to be less helpful than parents of normal children. • Maternal depression was correlated with higher activity estimates, but depression did not contribute independently to correlation between poor extended family relationships and higher activity scores.

Table 7 (Con't.)				
Webster-Stratton, C. (1988). Mothers' and fathers' perceptions of child deviance: Roles of parent and child behaviors and parent adjustment. Journal of consulting and Clinical Psychology, 56, 909-915.	120 mothers of children with conduct problems 85 fathers of children with conduct problems	Clinic referrals	Child's age between 3 and 8 No debilitating physical impairment, intellectual deficit or history of psychosis Existence of conduct problem over 6 months 2 SD above mean on Eyberg Child Behavior Inventory	• Mothers who were depressed or stressed due to marital problems perceived more deviant behaviors in children; interacted with children with more commands and criticism. • Fathers' perceptions of and behaviors with children unaffected by personal adjustment measures.
Webster-Stratton, C. & Hammond, M. (1988). Maternal depression and its relationship to life stress, perceptions of child behavior problems, parenting behaviors, and child conduct problems. Journal of Abnormal Child Psychology, 16, 299-315.	95 families	Clinic referrals for conduct problems	Child's age between 3 and 8 No disabilitating physical impairment, intellectual deficit, or history of psychosis Long-standing (over 6 months) child conduct problems Depression in mothers (score of 10 or greater on Beck Depression Inventory)	• Behavior of children of depressed mothers showed no differences. • Both groups of mothers (depressed and non-depressed) reported extremely high levels of stress due to children's difficult temperaments. • Depressed mothers reported more stress than non-depressed mothers due to feelings such as social isolation, self-blame, role restriction, incompetence, and lack of attachment to child. • Depressed mothers reported twice as many negative life events in previous year, e.g. unemployment, financial problems, or death in the family.

Table 7 (Con't.)				
Dumas, J.E. (1986). Indirect influence of maternal social contacts on mother-child interactions: A setting event analysis. Journal of Abnormal Child Psychology, 14, 205-216.	14 mother-child dyads	Clinic referrals	Children described as coercive and oppositional at home Mothers described themselves as having difficulty with children	• Mothers more aversive toward children on days in which they themselves experienced a high proportion of aversive interactions with adults than on days in which they did not; higher levels of aversiveness could not be attributed to corresponding change in child behavior.
Dumas, J.E. & Wahler, R.G. (1985). Indiscriminate mothering as a contextual factor in aggressive-opposition child behavior: *"Damned if you do and damned if you don't."* Journal of Abnormal Child Psychology, 31, 1-17.	52 mother-child dyads	Clinic referrals	Complete baseline data available Children described as coercive and oppositional at home and/or school Mothers described themselves as having problems with child	• Insular mothers (i.e., who had few community contacts) were more aversive than non-insular mothers in behavior toward child. • children of insular mothers more aversive in response to maternal behavior.
Mash, E.J. & Johnston, C. (1983). Parental perceptions of child behavior problems, parenting self-esteem, and mother's reported stress in younger and older hyperactive and normal children. Journal of Consulting and Clinical Psychology, 51, 86-99.	40 families with hyperactive child 51 families with control child (Both groups of children divided into younger and older children)	Clinic referrals (families with hyperactive child)	Clinical diagnosis of hyperactivity by referring agent Maternal report of developmental history of hyperactivity 2 SD above mean on Connors Abbreviated Rating Scale and Werry-Weiss Peters Activity Scale Average/above average IQ Free from gross neurological, sensatory, or motor impairments	• Mothers of younger hyperactive children reported markedly higher levels of stress associated with child characteristics and with their own feelings, e.g. depression, self-blame and social isolation. • Parenting self-esteem was lower in parents of hyperactives than in parents of normal children.

Table 7 (Con't.)				
Mash, E.J. & Johnston, C. (1983). The prediction of mothers' behavior with their hyperactive children during play and task situations. child and Family Behavior Therapy, 5, 1-14.	40 hyperactive children and mothers	Clinic referrals	Diagnosis of hyperactivity by referring agent Maternal report of a developmental history of hyperactivity 2 SD above mean on Conners' Abbreviated Rating Scale and Werry-Weiss Peters Activity Scale Average/above average intelligence Free from gross neurological, sensory, or motor impairments	• Mothers' reports of stress and self-esteem were significant predictors of their behavior only for structured task situations rather than free play situations.
Mash, E.J. & Johnston, C. (1983). Sibling interactions of hyperactive and normal children and their relationship to reports of maternal stress and self-esteem. Journal of Clinical Child Psychology, 12, 91-99.	23 hyperactive boys and siblings 23 normal boys and siblings	Ongoing research project of family interactions	Diagnosis of hyperactivity by referring agent Maternal report of a developmental history of hyperactivity 2 SD above mean on Conners' Abbreviated Rating Scale and Werry-Weiss Peters Activity Scale	• Maternal reports of stress and parenting self-esteem related to hyperactive child-sibling interaction, especially during supervised task situations.

Table 8

Family Stress/Dysfunction

STUDY	SAMPLES	SOURCE	SELECTION CRITERIA	FINDINGS/CONCLUSIONS
Campbell, S.B., Piere, E.W., March, C.L., Ewing, L.J. & Szumowski, E.L. (in press). Hard-to-manage preschool boys: Symptomatic behavior across contexts and time. Child Development.	42 boys with teacher-identified problems 27 boys with parent-identified problems 43 classroom controls	Preschools, clinics, pediatricians' offices	IQ of 80 or above No gross indications of brain damage or severe language delay DSM-III criteria for ADDH as measured by SNAP Age between 2¼ and 4¼ years	• Persistent problems (two years after first data collection) reflect more severe initial difficulties and a family environment that is more chaotic and less supportive.
Barkley, R.A., Fischer, M., Edelbrock, C.S. & Smallish, L. (1990). The adolescent outcome of hyperactive children diagnosed by research criteria: I. an 8-year perspective follow-up study. Journal of the American Academy of Child and Adolescent Psychiatry. 29, 546-557.	123 hyperactive children 66 controls	Clinic referrals	2 SD above mean on CRPS-Revised and Werry-Weiss Peters Activity Scale Scores indicating sig. problems on 6 of 14 problems situations on HSQ Parent/teacher complaints re: poor sustained attention, impulse control and hyperactivity Development of problems before age 6 Persistent of problems over one year No indication of autism, psychosis, thought disorder, epilepsy, gross brain damage or MR	• Families of hyperactive children more likely to experience unjustified unemployment longer than 6 months. • Fathers of hyperactive children more likely to be absent from work (unexcused), quit their jobs, change jobs, fail to repay debts, squander family income needed to meet basic needs, or remain monogamous. • Stability of job and residence much less typical of families of hyperactive children.

Table 8 (Con't.)				
Campbell, S.B. & Ewing, L.J. (1990). Follow-up of hard-to-manage preschoolers: Adjustment at age 9 and predictors of continuing symptoms. Journal of Child Psychology and Psychiatry and Allied Disciplines, 31, 871-889.	29 problem children 25 controls	Parent referrals	Parent complaints about overactivity, difficulty playing alone, short attention span, tantrums and defiance Good physical health No signs of gross brain damage, severe language delay, or psychotic-like behavior	• Ongoing family stress continued to predict problems, particularly symptoms of ADDH and conduct disorder, at age 9.
Marshall, V.G., Longwell, L., Goldstein, M.J. & Swanson, J.M. (1990). Family factors associated with aggressive symptomatology in boys with ADHD: A research note. Journal of Child Psychology and Psychiatry and Allied Disciplines, 31, 629-636.	28 boys with ADHD and their parents	Intensive summer program for ADHD children	Met criteria for ADHD in DSM-III-R Had parent/teacher ratings of 15 or greater on Conners Abbreviated Rating Scale Had academic work no more than 2 years below expected level Had normal intellectual functioning Demonstrated no sensory loss, psychosis, epilepsy, or brain damage Child living with parents	• A negative parent-child relationship was not correlated with ODD or CD associated behaviors. • Direct observations of parental behavior were not correlated with aggressiveness. • Aggressiveness and a negative family climate may be independent factors in determining the long-term course of ADHD in children.

Table 8 (Con't.)				
Goodman, B. & Stevenson, J. (1989). A twin study of hyperactivity-II. The actological role of genes, family relationships and perinatal adversity. Journal of Child Psychology and Psychiatry and Allied Disciplines, 30, 691-709.	102 monozygotic twin pairs 111 dizygotic twin girls	Large representative community sample of 13-year old twins	Not specified in this article	• Link between family factor sand hyperactivity was weak; modest correlations between trait measures of hyperactivity and adverse family factors, including parental malaise, marital discord, parental coldness to child and parental criticism of child. • Less than 10% of variance in hyperactivity and inattentiveness explained by family factors (genetic effects accounted for approximately half of explainable variance).
Handan-Allen, G., Stewart, M.A. & Beeghly, J.H. (1989). Subgrouping conduct disorder by psychiatric family history. Journal of Child Psychology and Psychiatry and Allied Disciplines, 30, 889-897.	191 children divided into 3 groups (pervasive aggressive conduct disorder, situational aggressive conduct disorder, and controls) N in each group not reported	Clinic referrals	IQ over 70 No psychosis, autism, or brain dysfunction	• Boys with pervasive aggressive conduct disorder came from families in which mothers abused drugs more often and fathers had more frequent antisocial behavior than other 2 groups. • Alcohol abuse more frequent among fathers of both conduct disordered groups compared to fathers of controls.
Szatmari,P., Boyle, M. & Offord, D.R. (1989). ADDH and conduct disorder: Degree of diagnostic overlap and differences among correlates. Journal of the American Academy of Child and Adolescent Psychiatry, 28, 865-872.	2,659 children in epidemiological study	Community	All children born in Ontario between January 1, 1976 and January 1, 1979, whose usual place of residence was a household dwelling in Ontario	• Neither being on welfare nor family dysfunction (nor sex) contributed to a diagnosis of ADDH when conduct disorder is removed as a possible confounding variable.

Table 8 (Con't.)				
Moffitt, T.E. (1990). Juvenile delinquency and ADD: Boys' developmental trajectories from age 3 to age 15. Child Development, 61, 893-910.	(435 males) 348 non-disordered 16 ADD nondelinquent 52 non-ADD delinquents 19 ADD delinquents	Dunedin Multidisciplinary Health and Development Study	Birth cohort	• ADD-only boys (the 16 ADD nondelinquent) had normal family scores. • ADD delinquents fared worse on assessments of family adversity.
Brown, R.T. & Pacini, J.N. (1989). Perceived family functioning, marital status, and depression in parents of boys with ADD. Journal of Learning Disabilities, 22, 581-587.	51 boys with ADD/H 34 boys in clinical control group (non ADD/H) 34 boys in control group	Clinic referrals (ADD/H boys and clinical control group)	Diagnosis of ADD/H using DMS-III criteria Living with at least one biological parent No evidence of psychosis or MR	• Parents of children with ADDH perceived their family environment as less supportive and more stressful than parents in other two groups. • ADDH parents viewed their families as having lower levels of interpersonal relationships. • More ADDH parents divorced or separated than parents in other two groups.

Table 8 (Con't.)				
Earls, F. & Jung, K.G. (1987). Temperament and name environment characteristics as causal factors in the early development of childhood psychopathology. Journal of the American Academy of Child and Adolescent Psychiatry, 26, 491-498.	48 boys and 47 girls (71% of 134 families comprising 1979 and 1980 cohorts in Martha's Vineyard Child Health Survey)	Community	Complete data on all variables included in analyses	• Temperament, rather than home environment, predicted behavior problems at age 3. • For males, temperament appears more important initially, but stressful home environments become important in determining the severity and persistence of problems.
Emery, R.E. & O'Leary, K.D. (1984). Marital discord and child behavior problems in a nonclinic sample. Journal of Abnormal Child Psychology, 12, 411-420.	132 mothers and children	Community / elementary schools	Volunteers for study (but no differences on Behavior Problem Checklist - teacher ratings for children whose mothers volunteered/did not volunteer)	• Weak association between marital discord and child behavior problems. • Different methodological procedures can lead to difference conclusions about strength of association between interparental conflict and child behavior problems.
McGee, R., Williams, S. & Silva, P.A. (1984). Background characteristics of aggressive, hyperactive, and aggressive/hyperactive boys. Journal of the American Academy of Child Psychiatry, 23, 280-284.	489 seven-year old boys	Dunedin Multidisciplinary Child Development Study	High scores on hyperactivity (restlessness, squirminess, poor concentration) and aggressiveness (destructiveness, bullying, fighting, disobedience, and irritability)	• Low maternal mental ability, poor maternal psychological health, parental separation, single-parent, and poor family relationships may interact with boys' cognitive impairments and other behavioral problems to limit ability of hyperactive children to cope with environmental stresses.

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Table 8 (Con't.)				
Cohen, N.J. & Minde, K. (1983). The hyperactive syndrome in kindergarten children: Comparison of children with pervasive and situational symptoms. Journal of Child Psychology and Psychiatry and Allied Disciplines, 24, 443-455.	39 hyperactive children divided into 3 groups: pervasive, situational, and clinical hyperactives 10 control children	Clinic referrals (hyperactive children)	Hyperactivity Short attention span Poor impulse control	• Broken homes, marital discord (also signs of development and parent psychiatric illness) differentiated three groups of hyperactive from normal children but not from each other.
Prinz, R.J., Myers, D., Holden, E., Tamowski, K. & Roberts, W. (1983). Marital disturbance and child problems: A covtianary note regarding hyperactive children. Journal of Abnormal Child Psychology, 11, 393-399.	29 ADDH children (23 boys, 6 girls)	Clinic referrals	Meets diagnostic criteria for ADDH	• Martial adjustment/hostility and conflict tactics not correlated with measures of aggression and conduct problems in ADDH boys (analyses done only on boys). • Martial discord marginally related to severity of attentional deficit on Continuous Performance Tests.

Table 9

Familial Risk

STUDY	SAMPLE	SOURCE	SELECTION CRITERIA	FINDINGS/CONCLUSIONS
Biederman, Faraone, S.V., Keenan, K., Steingard, R. & Tsuang, M.T. (1991). Familial association b/w ADD and anxiety disorders. American Journal of Psychiatry, 148, 251-256.	First degree relatives of 73 ADD children (the children were divided into two groups: those with and without anxiety)	Clinic referrals (ADD children)	DSM-III diagnosis of ADD Exclusion of mental retardation or chronic mental illness	• Familial risk for ADD was higher in relatives of children with ADD (both with and without anxiety disorder) than in relatives of control children • Risk for anxiety disorder was 2 x higher in relatives of children who had ADD and anxiety disorder than in relatives of children with ADD only, and was higher in relatives of all ADD children than in relatives of normal control children.
Faraone, S.V., Biederman, J., Keenan, K. & Tsuang, M.T. (1991). A family-genetic study of girls with DSM-III ADD. American Journal of Psychiatry, 148, 112-117.	21 girls with ADD 20 normal comparison girls First-degree relatives of ADD girls (n=69) First-degree relatives of normal girls (n=71)	Clinic referrals (ADD girls)	Diagnosis of ADD on basis of DSM-III (all but one met criterial for ADDH) Girls only	• Relatives of girls with ADD had higher risks for ADD, antisocial disorders, major depression, and anxiety disorders. • Higher risk for ADD could not be accounted for by gender, generation of relative, age of ADD proband, social class, or family intactness.

Table 9 (Con't.) Barkley, R.A., DuPaul, G.J. & McMurray, M.B. (1990). Comprehensive evaluation of ADD with and without hyperactivity as defined by research criteria. Journal of Consulting and Clinical Psychology, 58, 775-789.	48 ADD+H children 42 ADD-H children 16 LD children 34 control	Clinic referred	Parent Interview Structure Interview Vineland Scale CBCL HSQ Parent Self-Report Measures SCL-90-R Locke-Wallace Marital Test Life Stress Scale Teacher Rating Scales CBC SSQ ADHD Scale	• Higher number of relatives of ADD have ADD, aggressiveness, substance abuse, anxiety disorders, and learning problems. • Families of ADDH children have more ADD, aggression and substance abuse than families of ADD no H children. • Families of ADD no H children have more anxiety problems and learning disorders than families of ADDH children.
Goodman, B. & Stevenson, J. (1989). A twin study of hyperactivity-II. The aetiological role of genes, family relationships and perinatal adversity. Journal of Child Psychology and Psychiatry and Allied Disciplines, 30, 691-709.	102 Monozygotic twin pairs 111 dizygotic twin girls	Large representative community sample of 13-year-old twins	Not specified in this article	• Genetic effects accounts for approximately half the explainable variance in measures of hyperactivity (less than 10% of variance explained by adverse family factors, e.g. marital discord; perinatal adversity was not related to later hyperactive).
Biederman, J., Munir, K., Knee, D., Armentano, M., Author, S., Waternaux, C., & Tsuang, M.T. (1987). High rate of affective disorders in probands with ADD and in their relatives: A controlled family study. American Journal of Psychiatry, 144, 330-333.	First degree relatives of 22 children with ADD and 20 normal children	Clinic referrals (ADD children)	Boys 6-7 years old IQ above 80 on WISC DSM-III criteria for ADD Disorder manifested in at least 2 settings No adopted, autistic or psychotic children	• Rate of major affective disorder significantly higher in ADD probands (32%) and their relatives (27%) than in normal control subjects (0%) and their relatives (6%).

Table 9 (Con't.)				
Alberts-Corush, J., Firestone, P. & Goodman, J.T. (1986). Attention and impulsivity characteristics of the biological and adoptive parents of hyperactive and normal control children. American Journal of Orthopsychiatry, 56, 413-423.	43 ADDH children 25 biological control children 20 adopted control children	Clinic referrals (ADDH children)	Unspecified	• Biological parents of hyperactive children evidenced more attentional difficulties, slower mean reaction times, and fewer correct recognitions than other parents.
Biederman, J., Munir, K., Knee, D., Habelow, W., Armentano, M., Auter, S., Hodge, S.K. & Waternaux, C. (1986). A family study of patients with ADD and normal controls. Journal of Psychiatric Research, 20, 263-274.	First-degree relatives of 22 children with ADD First-degree relatives of 20 normal children	Clinic referrals (ADD children)	Age 6-17 years, Male Diagnosis of ADD according to DSM-III ADD manifested in at least two settings Diagnosis for ADD supported by clinical interview/structure of psychiatric interview with mother One parent available for children and adult interview IQ above 80 on WISC-R No adopted children No major physical or sensorimotor deficits	• Rate of ADD significantly higher in relatives of children with ADD (31.5%) than in relatives of children with ADD (5.7%). • Male relatives of ADD children more affected than female relatives; however, more females relatives of ADD children were affected than females realtes of non-ADD children. • Relatives of children with ADD also had higher rates of oppositional disorder, major depressive disorder, and conduct disorder than relatives of non-ADD children.

Table 9 (Con't.)				
Stewart, M., deBlois, S. & Cummings, D. (1980). Psychiatric disorder in the parents of hyperactive boys and those with conduct disorder. Journal of Child Psychology and Psychiatry, 21, 283-292.	126 boys diagnosed as unsocialized aggressive, unsocialized aggressive and hyperactive, probable unsocialized aggressive and hyperactive, and various other diagnoses	Clinic referrals (all children)	Age between 5 and 15 IQ above 55 Presently living with one natural parent or immediate relative No signs of epilepsy or psychosis	• Antisocial personality and alcoholism more common in natural fathers of unsocialized aggressive boys than in fathers of other boys. • There was no association between parental disorders noted above and hyperactivity.

Table 10

SES

STUDY	SAMPLE	SOURCE	SELECTED CRITERIA	FINDINGS/CONCLUSIONS
Pelfrey, J.S., Levine, M.D., Walker, D.K., & Sullivan, M. (1985). The emergence of attention deficits in early childhood; A prospective study. Development and Behavioral Pediatrics, 5, 339-348.	174 children with mixed backgrounds.	Intensive educational/diagnostic early education program.	Availability of 2nd grade follow-up data (174 out of original sample of 224 children, or 78% of original sample).	• Low maternal education level in addition to single parent home, coexistence of developmental lags, and presence of other maladaptive behaviors related to persistent concerns about chronic inattention, distractibility, disorganization, poor self-monitoring/impulsivity, and hyperactivity in young children.
Hechtman, L., Weiss, G., Perlman, R. & Amsel, R. (1984). Hyperactives as young adults: Initial predictors of outcome. Journal of the American Academy of Child and Adolescent Psychiatry, 23, 250-260.	85 hyperactive young adults (81% of original sample).	Clinic referrals	6-12 years of age at original data collection. Referral due to sustained, long standing hyperactivity at home and at school. IQ at least 85 No evidence of epilepsy, cerebral palsy, or psychosis.	• SES one of several predictors of school performance and adult outcome • Family mental health predicted emotional adjustment and nonmedical drug use. • Adult outcome of hyperactives not associated with particular variable, but with additive interaction of personality characteristics, social, and family factors.
McGee, R., Williams, S., & Silva, P.E. (1984). Background characteristics of aggressive, hyperactive, and aggressive-hyperactive boys. Journal of the American Academy of Child and Adolescent Psychiatry, 23, 280-284.	489 7-year old boys enrolled in Dunedin. Multidisciplinary Child Development Study	Community	Scores on hyperactivity and aggressiveness measures. Problems with hyperactivity and aggressiveness considered severe and stable by parents and teachers.	• Boys with hyperactivity/aggressive problems came from disadvantaged backgrounds, but disadvantage not strictly based on SES. Disadvantage also included low maternal mental ability, poor maternal psychological health, parental separation, and poor family relationships.

Table 10 (Con't.) Achenbach, T.M. & Edelbrock, S.W. (1981). Behavioral problems and competencies reported by parents of normal and disturbed children aged four through sixteen. Monographs of the Society for Research in Child Development, 46(1, Serial No. 188).	1300 clinic-referred children 1300 non-referred children	Clinic referrals (problem children)	Ages 4-16 Maintenance of normal distribution with regard to SES and race re: entire pool of cases.	• Minimal proportions of the variance in reported behavior problems accounted for by SES (and-or by race, gender, and age). • Clinical status had most numerous and strongest relations to behavioral problems and social competence. • Most problems reported more frequently for lower SES children and for boys were under controlled externalizing behaviors.
Schachar, R., Rutter, M. & Smith, A. (1981). The characteristics of situationally and pervasively hyperactive children: Implications for syndrome definition. Journal of Child Psychology and Psychiatry, 23, 375-392.	1536 children on Isle of Wight (72.4% of original sample).	Community	Participation in Isle of Wight epidemiological study and still living on island in 1968-69.	• Using father's occupation to determine social class, children from "lower" social class more likely to be rated as hyperactive than those from "higher" social class.

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